Volume 38 · Part 5 · May 1959

REVIEW OF APPLIED MYCOLOGY

COMPILED FROM WORLD LITERATURE ON PLANT PATHOLOGY AND APPLIED MYCOLOGY

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PRINTED IN GREAT BRITAIN AT THE UNIVERSITY PRESS, OXFORD, BY VIVIAN RIDLER, PRINTER TO THE UNIVERSITY

GRASSO (V.) & MADALUNI (ANNA L.). **Danni da Ustilago avenae e Ustilago kolleri su Avena riscontrati in alcune località della Provincia di Roma nell' anno 1957.** [Losses caused by *U. avenae* and *U. kolleri* in Oats noted in various parts of the Province of Rome in the year 1957.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (*1957*), 2, pp. 293–298, 1958. [English summary.]

U. avenae (the more prevalent) and *U. kolleri* [*U. hordei*] caused appreciable damage to oats throughout the area; av. infection was 5·3%, but on one property of 45 ha. the figure was 10·8%, tantamount to a loss of 9,620 lire/ha.

FLANGAS (A. L.). **Studies on the genetics of pathogenicity of Puccinia sorghi Schw.** —*Diss. Abstr.*, **18**, 6, pp. 1954–1955, 1958.

At the University of Wisconsin 4 cultures of *P. sorghi*, differing in pathogenicity on maize [**36**, p. 583] in the uredial stage, were inbred on the alternate host *Oxalis*. The 96 subcultures thus obtained were examined for pathogenicity, using 6 inbred maize lines representing 2 gene groups conditioning rust resistance and susceptibility, and were found to be segregated into 8 pathogenic types. It is suggested that in addition to a specific gene-for-gene relationship like that postulated by Flor [**35**, p. 526] a 'gene pool' may characterize the locus for pathogenicity which is involved in the conditioning of differential pathogenicity in the dikaryons of the rust in relation to specific genes in the host.

Annual Report of the West African Rice Research Station, 1957.—29 pp., 1 pl., 1 plan, 1958. 2*s*.

This report [cf. **37**, p. 83] notes considerable damage by *Piricularia oryzae* to Sughandi and some late-planted vars. in the nurseries, where *Helminthosporium oryzae* [*Cochliobolus miyabeanus*] was also present, but did no harm. *Ephelis pallida* [**35**, p. 165] occurred only on the local var. Kani Ngoihun.

JOHNSTON (T. H.). **Registration of Rice varieties.**—*Agron. J.*, **50**, 11, pp. 694–700, 1958. [34 ref.]

In this initial descriptive report on improved rice vars. approved for registration under a co-operative agreement between the Crops Research Division, U.S. Dept of Agriculture, and the American Society of Agronomy, it is stated that Century Patna 231 (Reg. No. 7) [cf. **34**, p. 317] is moderately resistant to the common races of narrow brown leaf spot [*Cercospora oryzae*]. Lacrosse (No. 11), from the Rice Experiment Station, Crowley, Louisiana, is moderately resistant to black sheath rot [unspecified] and straighthead [cf. **36**, p. 663], but is susceptible to other common diseases. It is not, at present, being grown commercially, but seed is being increased, as it has shown resistance to 'hoja blanca' virus [cf. **38**, p. 81], and its selections appear quite promising as sources of resistance.

Nato (No. 13), also from Crowley, is more resistant to straighthead, narrow brown leaf spot, and the [deficiency] disease white tip [cf. **19**, p. 493] than Zenith (No. 19), which at its release in 1936 by the Rice Branch Experiment Station, Stuttgart, Arkansas, showed high field resistance to blast (*Piricularia oryzae*) and some resistance to stem rot [*Leptosphaeria salvinii*: cf. **35**, p. 715]; Zenith appeared, also, to be slightly less susceptible than Early Prolific to leaf spot diseases and 'physiological browning' (*Bull. Arkansas agric. Exp. Sta.* 405, 1940). Races or strains of *P. oryzae* which attack Zenith are now present in the southern rice area and the acreage planted has declined since 1954. Mo. R-500 (No. 22) was resistant to 'hoja blanca' virus in tests.

QUEBRAL (F. C.) & GIBE (L. N.). **I. Occurrence of two Sorghum diseases in the Philippines.**—*Philipp. Agric.*, **42**, 5, pp. 190–193, 2 fig., 1958.

This is a 1st report of *Rhizoctonia* [*Corticium*] *solani* and *Cercospora sorghi* [map 338] on sorghum, observed at Los Banos, Laguna, in Aug. 1958. *Corticium solani* attacked both stalks and leaves of large numbers of plants of different vars. [cf. **36**, p. 242]. *Cercospora sorghi* [**21**, p. 47; map 338] caused tan spots on Miloca and reddish-purple spots on other vars.

REICHERT (I.). **Citrus virus diseases in the Mediterranean and the New World.**—*F.A.O. Pl. Prot. Bull.*, **6**, 12, pp. 180–183, 1958. [21 ref.]

In this useful paper, delivered at the Rockefeller Institute, New York, on 24 Feb. 1958, the author reviews and discusses recent contributions to knowledge of the distribution and spread of virus diseases of citrus, particularly tristeza [cf. **37**, p. 701; **38**, p. 3 *et passim*] and xyloporosis [cf. **36**, p. 526; **37**, p. 584 *et passim*]. In the absence of an efficient vector of tristeza virus in the Mediterranean area and the United States [**36**, p. 760] the disease presents no immediate danger there [cf. **36**, p. 100]. Xyloporosis is a far more serious problem in both regions, the sour orange rootstock used in the United States being, apparently, even more susceptible than that used in the Mediterranean area.

OLSON (E. O.), SLEETH (B.), & SHULL (A. V.). **Prevalence of viruses causing xyloporosis (cachexia) and exocortis (Rangpur Lime disease) in apparently healthy Citrus trees in Texas.**—*J. R. Grande Vall. hort. Inst.*, **12**, pp. 35–43, 1958. [*Hort. Abstr.*, **28**, 4, p. 640, 1958.]

Apparently healthy budwood-source trees of the following vars. were indexed for the named viruses on one or more indicator rootstocks: Orlando or Sunshine tangelo for cachexia [citrus xyloporosis virus: **36**, p. 99; **38**, p. 143], Columbian sweet lime for xyloporosis [**37**, p. 584], Morton citrange for exocortis [**37**, p. 476], and Rangpur lime for Rangpur lime disease [**37**, p. 41]. All old-line grapefruit trees tested on tangelo or sweet lime rootstock were infected by cachexia and xyloporosis viruses and many by Rangpur lime disease virus and exocortis. Nucellar grapefruit, sweet orange, Rangpur lime, old-line Orlando tangelo, and 1 Meyer lemon showed no evidence of virus infection. The results substantiate the hypothesis that xyloporosis and cachexia are caused by the same virus and Rangpur lime disease and exocortis also by 1 virus [loc. cit.].

KLOTZ (L. J.), DEWOLFE (T. A.), & WONG (P.-P.). **Decay of fibrous roots of Citrus.**—*Phytopathology*, **48**, 11, pp. 616–622, 4 fig., 1958. [18 ref.]

At the University of California Citrus Experiment Station, Riverside, the amount of root rot caused by *Phytophthora citrophthora* and *P. parasitica* [**37**, pp. 660, 720] in Homosassa sweet orange seedlings growing in disinfested inoculated soil in glass cylinders with a constant water level, or in tins, was greatly increased by excess of water, or of organic matter in the soil; seedlings given ammonium sulphate or urea were more susceptible than those with calcium nitrate. When citrus seedlings attached to wooden blocks were floated with only their roots in water, to which zoospores of the *Phytophthora* spp. were added, most of the root system was destroyed within 10 days at 23° C.; *Poncirus trifoliata* showed marked resistance [**37**, p. 283]. In the field healthy fibrous roots from dry root zones near the trunk were largely rotted after 14 days' exposure to wet, infested soil. In the greenhouse, using mixed inocula of several soil fungi, it was established that *Phytophthora citrophthora* was necessary to induce rotting.

Recommended control measures [**36**, p. 584; **37**, pp. 165, 720] include the repeated dusting of planting sites with spray-dried (reacted) Bordeaux mixture during the first 2 yr. of growth, starting immediately after soil disinfection, to prevent recontamination from irrigation or run off water.

LOEST (F. C.). **Black spot responsible for severe financial losses.**—*Fmg in S. Afr.*, **34**, 9, p. 33, 1 fig., 1958.

Citrus black spot (*Phoma* [*Guignardia*] *citricarpa*) [**35**, p. 163], formerly damaging only lemons and Valencia orange in Natal and the Transvaal, has spread in the past 5 yr. and now has to be controlled on navel orange and grapefruit as well. The best results are obtained with Cu fungicides applied after 2/3 petal-fall, with 2 subsequent sprays at 6 weeks' intervals. The disease, which is still spreading, is serious when storage temps. vary widely, as during day and night in railway trucks.

CYROT (J.). **The effect of mercerization on Cotton's resistance to microorganisms.**—*Text. Res. J.*, **18**, 12, p. 1048, 1958.

At the Institut Textile de France, 59 rue de la Faisanderie, Paris (16e), soil burial tests were performed on mercerized and unmercerized cotton at 35° C. and 100% R.H. in an electrically heated chamber. The initial dry breaking strength of the untreated fabric was 21 kg./cm², which fell after 1–2 days' burial to 0–2 kg./cm². The original dry breaking strength of the mercerized samples was 15–25 kg./cm² and it took 4–6 days to fall to 0–2 kg./cm². This 2–3-fold improvement, though quite significant in the light of the present results alone, is very small in comparison with a good rot-proofing treatment, which confers 30–40 days' resistance to soil burial.

Soil degradation activity was checked by changing untreated and mercerized samples every time they were degraded during the progress of the experiment. Untreated material was changed 2–4 times before the mercerized was degraded and 20–30 times before an effectively rot-proofed fabric became useless. During the same period the mercerized material was changed only 6–8 times. The disparity cannot be attributed to traces of the caustic soda or acetic acid used in the mercerization process, since samples boiled with 2% of the former or treated with 5% of the latter behaved like untreated in the tests. Moreover, mercerized cotton washed with detergents or treated with hypochlorite retained its breaking strength longer than unmercerized in soil burial tests.

NOUR (M. A.). **Cotton leaf mottle: a new virus disease of Cotton.**—*Emp. Cott. Gr. Rev.*, **36**, 1, pp. 32–34, 1 pl., 1959.

In Mar. 1958 a previously unknown disease was observed to be abundantly present on XL.1 Egyptian cotton at Geneid Pump Scheme [Republic of the Sudan]. The symptoms were most conspicuous on young, immature leaves, which were covered with an irregular mottling, particularly noticeable against the light, and most pronounced near the veins. Severely infected young leaves were very pale. The lobes of severely diseased leaves were often distorted and elongated and on most infected plants the main stem was stunted. Flowering appeared to be much suppressed. The disease was transmitted by grafting to other XL.1 plants and to X1730 A and Domains Sakel, identical symptoms appearing on all 3. The condition is considered to be a new virus disease of cotton.

PEARSON (E. O.) & MAXWELL DARLING (R. C.). **The insect pests of Cotton in tropical Africa.**—x+355 pp., 8 col. pl., 1 fig., 12 graphs, 3 maps. London, Empire Cotton Growing Corporation and Commonwealth Institute of Entomology, 1958. 40*s*. [686 ref.]

Scattered references to diseases occur in this informative manual, e.g., on pp. 25–52 (which cover sections on insects and diseases attacking the various parts of the cotton plant, the effects of insect attack on yield, notes on the different cotton-growing areas and their principal pests, and a key to the principal disorders of the crop) and pp. 232–234, 255, 287–297. Most of the principal fungus pathogens, *Xanthomonas malvacearum*, and leaf curl virus are mentioned. The parasitization of

Aphis gossypii by *Empusa fresenii* [cf. **8**, p. 158] and the presence of *Cladosporium* spp. in a secondary capacity on the aphid (p. 230) and on the sticky substances secreted by the extra-floral nectaries, especially of *Gossypium barbadense*, under the stimulus of attack by *Bemisia tabaci* (p. 232), are dealt with.

ANSELME (C.) & CHALVIGNAC (Mlle M. A.). **Le problème de la fatigue des sols trop cultivés en Lin.** [The problem of fatigue in soils over-cultivated with Flax.]—*Bull. tech. Minist. Agric. Fr.* 120, pp. 307–311, 1957. [English summary. Received 1958.]

A paper from the Station de Pathologie Végétale, Versailles [cf. **37**, p. 537], comprising a discussion of present knowledge of the problem [cf. **23**, p. 226; **38**, p. 209], followed by a report of an experiment run at Annouville-Vilmesnil, Seine Maritime, from 1949–56. A 30 are plot, cropped continuously with Wiera flax, was compared in the last 2 yr. with an adjacent plot, previously a tree nursery, which was put to flax in the last 2 yr. only. In 1955 the control crop was good while with a few exceptions plants in the continuous plot turned brown and shrivelled; *Fusarium* sp. was present in abundance in the collars. In 1956 the control crop was again good while the experimental crop gradually became completely weed-ridden. In the greenhouse samples of the 'sick' soil gave rise to *Fusarium* infection, killing 3–5 times as many flax plants as the control soil. The condition of fibres from 'sick' plants suggested K or N deficiency, but this was not demonstrable in the soil, so it may be that shortage of B, Fe, and Mg prevents the assimilation of those elements. *Pseudomonas* and *Achromobacter*, bacteria antagonistic to *Fusarium*, were not present in 'sick' soils.

CLOSE (R.). **Antirrhinum rust in New Zealand.**—*N.Z.J. Agric.*, **97**, 6, pp. 551–552, 2 fig., 1958.

Puccinia antirrhini was 1st found in Auckland in Dec. 1953 [cf. **34**, p. 18; map 40] and thereafter spread rapidly to many other parts of New Zealand. In Jan. 1955 plants of a *Linaria* sp. (most probably *L. maroccana*) in Wellington were found infected with the rust. Climatic conditions appear to be ideal for its spread. Injury to antirrhinum plants under moist conditions is due mainly to secondary fungi entering via the pustules. The race involved appears to be similar to or identical with the American race 2 but it is possible that race 1 is present also.

GROUET (Mme D.). **Quelques données nouvelles relatives au cycle évolutif de l'Entyloma du Dahlia.** [Some new data on the life-cycle of the *Entyloma* on Dahlia.]—*Rev. Path. vég.*, **37**, 3, pp. 217–226, 5 fig., 1958.

In this further study of *Entyloma dahliae* [cf. **35**, p. 100] 2 kinds of exogenous spore were found (1) hyaline, curved, needle-shaped spores, 40–70 × 2 μ, in bundles on the upper leaf surface in spring and autumn; (2) shorter spores, 15 × 3 μ, on the lower surface or, in damp conditions, also on the upper surface. Chlamydospores measure 13–16 μ diam. and are capable of germinating *in situ*. They form a promycelium with a crown of 'primary sporidia' [cf. **33**, p. 86], fusions between which occurred only occasionally. Anastomoses may occur either at the base or at the tip. Sometimes all the sporidia germinated singly; germ tubes were emitted at the base or the tip and gave rise to the needle-shaped spores or (much more rarely) the shorter spores. The needle-shaped spores are sometimes called 'secondary sporidia'.

Sometimes on fresh material numerous elongated spores were observed; their development might be analogous to that of 'conidia'.

The haploid 'conidia' would appear to be capable of infecting the plant and giving rise to endogenous haploid mycelia, at first independent, but later fusing to produce diploid chlamydospores.

Green (D. E.) & Brooks (A. V.). **A note on the effect of P.C.N.B. in controlling Tulip fire disease in the soil.**—*J.R. hort. Soc.*, **83**, 12, pp. 517–518, 1958.

Plots at Wisley, Surrey, on ground heavily infested with tulip fire (*Botrytis tulipae*) were planted in 1957 with var. Queen of the Bartigons. Half, treated with a proprietary dust containing pentachloronitrobenzene (2 oz./sq. yd.) [cf. **37**, p. 20] one day before planting, developed fire in 37 of the 480 planted, compared with 161 of the untreated. Infected plants, so crippled that they would not flower, but would infect neighbouring plants, were removed. The treated plants had superior blooms and more robust foliage. Spray treatments should begin when the plants are 1 or 2 in. high.

Semal (J.). **An aphid-transmitted Tobacco ring-spot-like virus isolated from Begonia tuberhybrida.**—*Nature, Lond.*, **182**, 4650, p. 1688, 1958.

Samsun tobacco plants and Blanc Hâtif cucumbers, inoculated at the Agronomical Institute, Gembloux, Belgium, with sap from a multiflora *B. tuberhybrida* with leaves showing yellow spots surrounded by a necrotic line, developed symptoms similar to those produced by the group of tobacco ring spot viruses [**19**, p. 668]. The virus was inactivated in sap by 10 min. heating at 70° C., and was unusual in that it was easily transmitted by *Myzus persicae* from tobacco to cucumber (1–2 min. acquisition feeding after 2–3 hr. starvation; 24 hr. inoculation feeding; 10 aphids/plant). The begonia virus did not protect tobacco against the type strain of tobacco ringspot virus. [This information is also noted in *Parasitica*, **14**, 3, p. 115, 1958.

Valenta (V.). **Poznámky o víruse nekrózy Tabaku v Československu.** [Notes on Tobacco necrosis virus in Czechoslovakia.]—*Biológia, Bratislava*, **12**, pp. 808–815, 8 fig., 1957. [Russian, German, and English summaries. Received Dec. 1958.]

Tobacco necrosis virus was isolated in Bratislava in 1951 from greenhouse and field tulips with necrotic symptoms [cf. **36**, pp. 29, 514]. Necrosis of the parenchyma occurs in systemically infected tulips but the vascular bundles are not affected and only occasional necroses were observed in single phloem cells.

Stone (Olwen M.). **Some observations on Septoria gladioli Pass.**—*Trans. Brit. mycol. Soc.*, **41**, 4, pp. 505–518, 1 map, 1958.

A survey from the Botany School, University of Cambridge, of Kew and Cambridge herbarium material of the genus *Gladiolus* indicated *S. gladioli* to be endemic on 8 *G.* spp. native to Europe (564 sheets, 51 of which showed the fungus), and to have been present there before the gladiolus became widely cultivated. The only records from the British Isles were from the New Forest, Hants, all on *G. illyricus*. Its position in Africa (569 sheets, 5 with comparable spots) is doubtful. The infection of leaf bases overlying corms, on which the fungus forms sclerotia, causes much annual re-infection of corms; leaf-to-leaf infection is common in plants raised from cormlets and seedlings, on which pycnidia are also produced [cf. **26**, p. 340]. The fungus on the leaf bases can be killed, though further investigation of fungicides is needed; in the corm itself it is very persistent and no present treatment will eradicate it completely [**24**, p. 102].

Diseases of Irises.—*Agric. Gaz. N.S.W.*, **69**, 9, pp. 482–486, 5 fig., 1958.

Diseases of rhizomatous irises are briefly described. Leaf spot (*Heterosporium iridis*) [*Mycosphaerella macrospora*: **30**, p. 568; **32**, p. 63] is worst in warm, wet weather, and spraying with copper oxychloride (1 oz./3 gal.+1 oz. white oil/1 gal. spray) is recommended. Crown rots, including that caused by *Sclerotium rolfsii* [**34**, p. 455] and soft rot (*Erwinia carotovora*) [**20**, p. 119; **35**, p. 813], may be troublesome in crowded beds; the latter is worst in summer and autumn, infection being

via injuries. Both should be countered by excision, and disinfection of the plant and soil with phenylmercury acetate (1 fl. oz. 2% emulsion/5 pints water). Iris mosaic [virus: **30**, p. 568], appearing as a light, yellow-green streaking of the leaves, is more serious in bulbous irises, in which a dark and light mottling of young leaves and bud sheaths appears; bulbous irises are also susceptible to leaf spot and crown rot, but to a lesser extent.

BURKILL (H. M.). **Pests and diseases.**—*Rep. bot. Gdns Dep. Singapore 1957*, pp. 14–15, 1958.

Brown patches and rings on turf of *Zoysia* sp. were caused by *Helminthosporium oryzae* [*Cochliobolus miyabeanus*].

GRIFFITHS (E.). **Sexual reproduction and variation in Gloeotinia temulenta (Prill. & Delacr.) Wilson, [Noble] & Gray.**—*Trans. Brit. mycol. Soc.*, **41**, 4, pp. 461–482, 1 pl. (6 fig.), 1 diag., 1958.

Work at University College of Wales, Aberystwyth, showed that *G. temulenta* [**37**, p. 731] is obligately heterothallic and bipolar. Apothecia are produced from ascogonial stromata fertilized by microconidia of a compatible strain; mating is facilitated by the frequent simultaneous infection of rye grass seeds (*Lolium* spp.) by several strains. There is extensive cultural variation. Mycelial and conidial strains of *G. temulenta* [**25**, p. 35] are not sharply defined, and expression of the conidial-mycelial character is controlled by more than 1 pair of alleles and is affected by the substrate. All the 50 isolates studied had similar nutritional requirements and were biotin dependent and partially aneurin [thiamin] dependent.

WRIGHT (C. E.) & WILSON (E. V. B.). **Blind seed disease of Ryegrass. IV. Bulk spore production for use in the induction of large scale epiphytotics. V. Methods of inoculation for use in the induction of large scale epiphytotics.**—*Res. & exp. Rec. Minist. Agric. N. Ireland*, **7** (*1957*), pp. 1–7, 1 pl.; pp. 8–16, 4 pl., 1958.

Paper IV of this series [**37**, p. 363] reports that the most satisfactory method for the production of conidial suspensions of *Phialea* [*Gloeotinia*] *temulenta* is to culture on field peas [cf. **32**, p. 353] soaked in water overnight, strained, and autoclaved at 10 lb. pressure for 30 min.; 10 ml. of suspension, containing about 10,000,000 spores/ml., is added to 1 l. flasks containing 120 g. of peas, which are then incubated at 22° C. for 5 days with occasional shaking. The peas from several flasks are then washed several times with 6 gal. water in a 10-gal. end-over-end hand operated churn. The suspension obtained is sampled for concentration and diluted for inoculation; 4 flasks will produce about 16–20 gal. spore suspension of 1,000,000 spores/ml.

The 5th paper describes inoculation techniques. Although dipping flower spikes in the spore suspension gave the highest infection (mean 32·67%), spraying was adequate (25·17%), much easier to carry out, and the mean seed yield/plant was 13·06 g. as opposed to 10·2 after immersion. A semi-natural method [**37**, p. 364] gave 16·58% infection.

New Ryegrass available.—*Rice J.*, **61**, 12, p. 13, 1958. (Reprinted from 'Rice Notes and Quotes'.—*Mimeogr. Bull. Tex. A. & M. Coll.*)

R. J. HODGES reports that Gulf rye grass [*Lolium* sp.], available to certified seed producers at the Rice Pasture Experiment Station [? Texas], is more resistant to leaf rust [*Puccinia triticina*: cf. **33**, p. 102] than vars. hitherto available. Introduced from Uruguay, it has been under test for the past 6 yr.

KOLP (B. J.). **The inheritance of resistance to powdery mildew, Erysiphe polygoni DC., in red Clover, Trifolium pratense.**—*Diss. Abstr.*, **19**, 2, pp. 200–201, 1958.

In the autumn of 1955 red clover plants were selected from the field and rated for

reaction to powdery mildew [cf. **37**, p. 331] as resistant, moderately susceptible, susceptible, and highly susceptible in the greenhouse at Kansas State College. Several crosses were made among these plants. Parent plants and the F_1 and F_2 were inoculated by placing potted, infected plants among them. F_1 progenies from resistant parents and from resistant × moderately susceptible were all resistant.

The hypothesis that 2 loci with 2 alleles/locus controlled resistance was tested. The B gene was found to be dominant for susceptibility, and was inhibited by the A gene (dominant for resistance). A 3rd gene(s) was detected; if this (C) was dominant for susceptibility and inhibited gene A, the ratios obtained in the F_2 could be explained, but this hypothesis was not tested by the data.

The results obtained indicate that the use of tester plants would be the most effective method of isolating resistant strains. A recurrent selection programme in which resistant plants are saved would be effective in selecting against the 3rd gene(s), which appears to be dominant for susceptibility.

STURM (H.). **Untersuchungen über das Auftreten von echtem Mehltau (Erysiphe polygoni DC.) an Kleearten bei verschiedenen Umweltverhältnissen.** [Studies on the occurrence of true mildew (*E. polygoni*) on Clover spp. under diverse environmental conditions.]—*Z. Acker- u. PflBau*, **107**, 2, pp. 203–240, 3 fig., 3 graphs, 1958. [English summary. 30 ref.]

At the Institut für Acker- und Pflanzenbau der Technischen Hochschule München, Weihenstephan, Bavaria, Germany, 2 biotypes of *E. polygoni* [**4**, p. 431] were differentiated on red clover; 1 attacked var. Oberhaunstadter, a Portuguese sample, and some of the plants from a commercial assortment, while the other was pathogenic to all the German and some of the commercial vars. Only 1 biotype was distinguished on crimson and alsike clovers.

The more rapidly the mycelium was able to spread at the onset of infection the heavier was the loss of yield, especially in the stems. The reactions of the experimental vars. to varied environmental conditions were generally similar except for the very susceptible Württemberger, the responses of which were highly anomalous.

N raised the incidence of infection [**6**, p. 570] through a curtailment of the incubation period, leading to premature death of the leaves. Development also appeared to be promoted by heavy P applications but high K retarded mycelial spread and reduced the severity of infection, the most effective protection against crop reductions being conferred by 5 times the normal rate. The beneficial effect of K depended on the accompanying anions and decreased in the sequence silicate [**16**, p. 519], chloride, citrate, and sulphate. The above results with N, P, and K agree with those already reported in connexion with barley and wheat mildew [*E. graminis*: **37**, p. 278]. With lower K, P enhanced the influence of N, whereas the effect of higher K was promoted by P.

A reduction in the soil moisture content from 80 or 60 to 40% reduced the tendency to infection, though the increase in plant vigour at the higher levels prevented a correspondingly large decline in yield. On the other hand, with constant humidity in the greenhouse there were extensive yield reductions.

The crude and pure protein contents of the foliage was higher by 1–4% in the diseased than in the mildew-free.

HARVEY (H. L.). **A note on the occurrence of stunt disease in subterranean Clover.** —*J. Agric. W. Aust.*, **7**, 6, pp. 634–637, 3 fig., 1958.

The stunt virus disease on subterranean clover, formerly referred to as 'little leaf' [cf. **37**, p. 672], was probably present in S. coastal areas of the State as early as 1955 and has since been observed on Bacchus, Marsh, Dwalganup, and Yarloop

vars., generally with 1–2% incidence, though in 1 case about 90% of the plants were affected. The disease is also present in Tasmania [**36**, p. 649].

Adams (M. W.) & Semeniuk (G.). **The heritability of reaction in Alfalfa to common leafspot.**—*Agron. J.*, **50**, 11, pp. 677–679, 5 graphs, 1958.

Evidence on the reaction of lucerne to leaf spot (*Pseudopeziza medicaginis*) [cf. **21**, p. 22; **36**, p. 766, *et passim*] was obtained from 2 nurseries at the Agronomy Farm, Brookings, S. Dakota, on naturally infected plants in the field. The method used (estimate of the fraction of total leaf area infected) was comparable to that of counting the sporulating and non-sporulating lesions. One nursery (clonal, self, and diallele-cross progeny of 9 tetraploid plants) was scored in 1952, the other (clonal progeny of each of the 24 parents) in 1953 (total of plants approx. 2,400).

The data obtained showed that estimates of heritability can be strongly influenced by the size of the environmental variance. The family heritability estimates themselves ranged from 79·26–89·62%, which suggested the preponderant influence of genes the net effects of which were additive.

It is suggested to breeders that progress in breeding varieties of lucerne resistant to leaf spot can be expected, provided sufficient genetic variance is present in the sample. Selection according to family means, or mass selection as represented by selection in a replicated clonal nursery, should prove satisfactory for identifying superior genotypes.

Hanson (C. H.). **Registration of varieties and strains of Alfalfa, IV.**—*Agron. J.*, **50**, 11, pp. 684–685, 1958.

Caliverde lucerne (Reg. No. 7), a backcross-derived var. developed at the Californian Agricultural Experiment Station, possesses resistance to bacterial wilt [*Corynebacterium insidiosum*: cf. **36**, p. 249] equal to that of Ranger [**24**, p. 510], to *Pseudopeziza* leaf spot [*P. medicaginis*: see above], and to downy mildew [*Peronospora trifoliorum*: cf. **35**, p. 896]. Agronomically, it resembles its recurrent parent, California Common, and it is adapted to the conditions generally prevailing in California. Lahontan (No. 8), developed by the Crops Research Division in cooperation with Nevada Agricultural Experiment Station, is resistant to bacterial wilt and gave a slightly better forage production than Ranger at Reno, Nevada.

Zschau (K.). **Eine Mosaikkrankheit des Wundklees (Anthyllis vulneraria L.) verursacht durch das Gelbmosaikvirus der Buschbohne (Phaseolus virus 2 (Pierce) Smith = Marmor manifestum Frandsen (1952)).** [A mosaic disease of Kidney Vetch (*A. vulneraria*) caused by Bean yellow mosaic virus (*Phaseolus* virus 2 = *M. manifestum*).]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **12**, 9, pp. 179–180, 4 fig., 1958.

At Kleinmachnow in July 1956 plants of *A. vulneraria* were seen with marked reddish-brown ring-spotting and veinbanding symptoms. In the following year the same plants exhibited a strong mosaic, the original symptoms being discernible only in isolated instances on the rosette leaves. From symptoms on various leguminous spp., including 12 vars. of *Phaseolus vulgaris* [**33**, p. 517], and from the characteristics *in vitro* (inactivation after 10 min. at 62–64° C., dilution end point 1:5,000, longevity more than 5 days at room temp.) it is concluded that this is a strain of bean yellow mosaic virus differing from those so far known in Germany, *A. vulneraria* being recorded as a host apparently for the 1st time. Similar symptoms on *A. vulneraria* are not uncommonly seen at Müncheberg.

Vukovits (G.). **Über die Entstehung der Monilinia-schwarzfäule des Kernobstes.** [On the origin of *Monilinia*-black rot in pome fruits.]—*PflSchBer.*, **21**, 11–12, pp. 169–184, 2 fig., 1958. [English summary.]

In inoculation experiments at the Bundesanstalt für Pflanzenschutz, Vienna, with

3 isolates of *Monilinia* [*Sclerotinia*] *fructigena*, 2 of *M.* [*S.*] *laxa*, and fruit of the apple vars. Ilzer Rosenapfel, Ananas Reinette, and Schöner von Boskoop black rot [**25**, p. 123] occurred when the hyphae penetrated the intercellular spaces of the skin and produced a sclerotial layer just below the cuticle. The condition, caused by both fungi, was not confined to any one var. and was independent of the type of cuticle.

External factors favouring the development of black rot in storage are inadequate light, low temp. and R.H., and probably low atmospheric O under certain conditions.

Siebs (E.). **Ergebnisse zu Problemen des Mehltaus und der Mehltauresistenz des Apfels. I. Mehltau.** [Answers to problems on mildew and mildew resistance in Apple. I. Mildew.]—*Phytopath. Z.*, **34**, 1, pp. 86–102, 3 fig., 1958. [English summary.]

Experiments at the Max-Planck Institut für Züchtungsforschung, Köln-Vogelsang, Germany, showed that the difficulty of testing several-year-old apple trees on high open ground for reaction to powdery mildew (*Podosphaera leucotricha*) [cf. **34**, p. 462] can best be overcome by inoculation of detached young leaves in the laboratory. By this method some apple spp. which were difficult to infect in the orchard proved susceptible. Cross inoculations demonstrated the existence of several physiological races of the fungus, which arise from fusions of genetically different mycelia. For example, races from Gravenstein, Ontario, and Cox's Orange were pathogenically different. One important reason for the difficulty in cultivating the fungus *in vitro* is the achievement and maintenance of redox-levels comparable with the anaerobic conditions of the contents of the intact host cells.

Sewell (G. W. F.) & Wilson (J. R.). **Resistance trials of some Apple rootstock varieties to Phytophthora cactorum (L. & C.) Schroet.**—*J. hort. Sci.*, **34**, 1, pp. 51–58, 1 pl., 1959.

Of a number of apple rootstocks tested at East Malling for resistance to *P. cactorum* [**37**, pp. 88, 667; **38**, p. 213], none were completely resistant, but Malling, Malling-Merton, and M.IX crosses showed greater resistance than Cox's Orange Pippin. Resistance of rootstocks and pathogenicity of different isolates varied considerably. M.XII, M.XIII, M.XVI, M.26 (3436), MM. 103, MM. 107, MM. 110, MM. 115, MM. 113, and 3438 were little resistant, M.1, Crab C, and MM. 112 intermediate, and the remainder, including MM. 104, MM. 106, MM. 109, MM. 111, and M.XXV, recently released in Britain, were of comparably higher resistance than M.II [**35**, p. 875].

C[roxall] (H. E.). **Bitter rot of Apples caused by Gloeosporium spp.**—*N.A.A.S. quart. Rev.* 41, pp. 29–33, 1958. [16 ref.]

A review of published information on this condition, caused by *G. album* and *G.* [*Neofabraea*] *perennans* [**38**, pp. 14, 151, *et passim*], with reference to canker removal, rots in storage, spraying in general, and low and high volume spraying trials with Cox's Orange Pippin.

Edney (K. L.). **Observations on the infection of Cox's Orange Pippin Apples by Gloeosporium perennans Zeller & Childs.**—*Ann. appl. Biol.*, **46**, 4, pp. 622–629, 2 pl. (12 fig.), 1 graph, 1958.

In further studies at the Ditton Laboratory, Larkfield, Kent, the fungus on the surface of the fruit was stained in fresh 0·1% trypan blue in 45% acetic acid for 2 min., then rinsed in 20% acetic and water. The conidia of *G.* [*Neofabraea*] *perennans* [cf. **36**, p. 704; see above] on Cox's Orange Pippin apples in the orchard

produce a germ tube which swells into a thick-walled appressorium, the infection thread penetrating the unsuberized epidermal walls but not forming if the underlying tissues had become suberized. Subsequent rotting takes place either by penetration through a point of weakness in the suberized layer of cells across the lenticel, as in Cox's Orange Pippin, or by direct invasion of this layer, as in Sunset. Some lenticels had no suberized layer.

Fruit infected in Aug. and Sept. rotted in storage at 37° F. more rapidly than fruit infected in June and July of the same year. Rate of rotting increased with the size of the fruit.

Sitterly (W. R.). **Physiological factors affecting the onset of susceptibility of Apple fruit to rotting by Botryosphaeria ribis G. & D., Glomerella cingulata (Stonem.) S. & v S., Physalospora obtusa (Schw.) Cooke, and Neofabraea malicorticis (Cordley) Jackson.**—*Diss. Abstr.*, **18**, 6, pp. 1957–1958, 1958.

At Purdue University intact fruits treated with maleic hydrazide to inhibit respiration could be infected with *B. ribis* 10 days before untreated. Picked immature fruits treated with ethylene to stimulate respiration developed infection 30 days before untreated field controls. All fruits developed infection at the time of the climacteric respiration rise. It may be that ethylene and maleic hydrazide act as inhibitors of respiration, thus allowing enough carbohydrate accumulation to permit growth of the pathogens earlier than usual.

In vitro at pH 3·5–5·5 the growth of all 4 fungi was significantly increased with sucrose, *G. cingulata* and *B. ribis* with fructose, *N. malicorticis* [*N. perennans*] with starch, *P. obtusa* with maltose, and *B. ribis* with tyrosine. Of 10 compounds most favouring the growth of *B. ribis*, tyrosine, fructose, and sucrose, injected into fruits of Golden Delicious, Grimes Golden, and Rome Beauty through the spur leaf petiole, induced infection 3 weeks earlier than in the untreated, but only glucose and fructose, used at the conc. present in mature fruits, produced increased growth *in vitro*. On the other hand, compounds which failed to support growth did not delay infection when injected into almost mature fruits: in spore germination tests tannin was the only one of these which proved toxic. Since the inhibition produced by tannin *in vitro* was reversed by the addition of fructose, it may be that its failure to delay field infection is due to the presence of natural sugar in sufficient conc. to overcome its inhibitory effect. Growth of the 4 pathogens was 5 times greater on extracts of ripe Golden Delicious fruits than on extracts of immature fruits. *B. ribis* grew as well on a mixture of the extracts as on the mature extract alone, which stimulated all the pathogens except *N. perennans*. These results are taken to indicate that a specific conc. of some organic compound is important in fruit susceptibility. Resistance in immature fruits is connected with the low conc. of sucrose.

Huelin (F. E.) & Kennett (B. H.). **Superficial scald, a functional disorder of stored Apples. I. The role of volatile substances.**—*J. Sci. Fd Agric.*, **9**, 10, pp. 657–666, 1958.

Of 19 volatile substances [cf. **38**, p. 15] examined at the Division of Food Preservation, Homebush, New South Wales, for their ability to induce apple scald, only butyric and caproic acids and butyl and hexyl acetates, all at 1 mol/10,000 mols air, significantly increased scald in oil-wrapped fruits, and the level was always below that of unwrapped, untreated fruit. The conc. of volatile acids, alcohols, and esters in the scald-liable tissue was unaffected by storage in oil wraps. Crude 'hexane' at 1 mol/150 mols air gave excellent control, which was reduced when the purified product was used. The evidence suggests that the scald-inducing principal is not a major component of the volatile substances found in the storage atmosphere. It is probably less volatile than those so far identified, as its removal

from the fruit appears to be the critical requirement in control: the cuticle appears to play a part in the resistance to its removal [cf. **32**, p. 680].

An oiled wrap in good contact with the fruit is more effective than good ventilation or conditioning of the storage atmosphere. While the wrap may remove injurious substances, and may do so better than good ventilation, at least some of its effect may be due to inhibitors released to the fruit [cf. **36**, p. 105]. The inhibitory effect of 'hexane' suggests that hydrocarbons in mineral oil wraps or the natural coating may help to control scald, but the equally good control given by vegetable oils cannot be thus explained.

HATTINGEN (RUTH). **Zur Frage der parasitären Natur von Trichothecium roseum Link bei Äpfeln und Birnen.** [On the question of the parasitic nature of *T. roseum* on Apples and Pears.]—*Jb. bayer. Landw.*, **35**, 5, pp. 627–633, 1958.

In 1956 *T. roseum* infection was noted on Le Lectier pears still on the trees, entry being through wounds or scab [*Venturia pirina*] lesions [cf. **26**, p. 247]. When the resulting rot was of the soft type, bacteria (Gram+ rods) were also found. Sound fruits of Le Lectier and Gute Luise, sprayed with spore suspension while still attached, developed infection only at the site of pinpricks and bacterial infection was restricted to the wounded cells. In a similar experiment with the apple vars. Ontario and Boskoop there was no invasion of artificial wounds, but once the fungus established itself in a scab [*Venturia inaequalis*] lesion without spreading. The resistance of stored apples decreased with increasing length of storage, the onset of susceptibility occurring at different times in different vars.

GRASMANIS (V. O.). **Manganese excess and bark necrosis in Pears. Manganese excess and bark necrosis in Apples.**—*J. Aust. Inst. agric. Sci.*, **24**, 4, pp. 347–349; 350–351, 1958.

Investigations of a condition of Josephine pear trees growing at the Research Station, Tatura, Goulburn Valley, Victoria, referred to as 'papery bark' and consisting of an internal bark necrosis, with a cracking of the outer bark of shoots and limbs and a rolling of the bark cuticle, indicated that severity was correlated with the amount of extractable Mn in the leaves. The Mn content of leaves from trees with these symptoms was 15–20 p.p.m. compared to 0–5 in healthy trees. Injection of $MnSO_4$ into limbs of a healthy Josephine pear tree was followed by a gradual decline in their health. The incidence of a disorder known locally as 'leaf spotting' also appeared to increase with high Mn.

In the 2nd note it is stated that Delicious apple trees at Tongala, Goulburn Valley, growing on neutral to slightly acid brown loam on medium to heavy clay are affected by 'measles', an internal bark necrosis with protuberances scattered over the surface of the bark of shoots 1 yr. old or more, brown, necrotic areas in the bark beneath the raised pustules, and a roughened appearance, sometimes accompanied by a cracking of the outer bark, of older twigs and limbs. Analyses of the Mn content of leaves from healthy and affected trees indicated that the severity of the condition was positively correlated with the amounts of Mn present in fresh leaves [cf. **34**, p. 602; **36**, p. 210] (3–5 p.p.m. in those of healthy trees and 12–36 p.p.m. in those of increasingly affected trees). It is suspected that anaerobic conditions induced by waterlogging of the soil greatly increased the amount of divalent Mn, which led to an excessive uptake of this element. Injections of $MnSO_4$ into healthy apple trees indicated that 200 p.p.m. of extractable Mn in fresh leaves is the most the tree can tolerate without obvious heavy damage.

LELLIOTT (R. A.). **Fire blight of Pears in England.**—*Agriculture, Lond.*, **65**, 11, pp. 564–568, 2 pl., 1959.

By the end of 1958 15 outbreaks of fire blight (*Erwinia amylovora*) on pears [**38**,

p. 215] were confirmed in England, 14 in Kent and 1 in Worcestershire. In Kent the distribution is generally consistent with spread, probably by pollinating insects, from three centres, near Maidstone, Rochester, and Swanley Junction. It is thought that the disease was introduced either with young trees or propagating material, or on boxes contaminated with bacteria. So far only pears, some 2,600 trees, mostly Laxton's Superb, are known to be affected. The spread of the disease is rapid and if it reaches the trunk the tree usually dies, often within 1 yr. It is considered that max. temps. in Kent at blossom time would not generally be opt. for severe blossom infection of pears or early flowering apples. By the end of Jan. 1959 all the trees known to be diseased had been destroyed.

Bhargava (K. S.) & Gupta (S. C.). **Market diseases of fruits and vegetables in Kumaon. II. Rhizopus rot of Plums (Prunus communis).**—*Hort. Advance*, **1**, 1, pp. 65–67, 1 pl., 1957.

A rot of plums, with typical mouldy growth on the surface, occurring in the market at Nainital, India, during the summer, was found, at the D.S.B. Government College, to be caused by *Rhizopus stolonifer* [cf. **31**, p. 388; **38**, p. 91]. This disease has not previously been recorded in India.

Schuch (K.). **Viruskrankheiten der Aprikose.** [Virus diseases of the Apricot.]—*Gartenbauwiss.*, **23** (**5**), 1, pp. 82–86, 6 fig., 1958.

At the Institut für Obstbau, Heidelberg, Germany, grafting scions from an apricot tree with line-pattern symptoms to indicator plants (seedlings of Myrobalan and apricot) produced symptoms identical with those of plum line pattern virus [cf. **35**, p. 374]. Grafting from an apricot with indistinct pale green patches and rings on the leaves to Myrobalan, apricot, and peach seedlings led to the identification of the virus as peach ring spot [cf. **37**, p. 91]: identical symptoms were produced by grafting from a cherry with ring spot.

Schuch (K.). **Reaktionsbilder bei der F 12/1-Unterlage nach künstlicher Virusinfektion.** [Symptoms in the F 12/1 stock after artificial virus infection.]—*Dtsch. Baumschule*, **10**, 2, pp. 36–38, 5 fig., 1958.

A brief description, from the Institut für Obstbau, Heidelberg, of the characteristic foliage symptoms (local clearing to form ring spots and patches, reddish-brown discoloration, and necrosis) produced in the cherry (*Prunus avium*) stock F 12/1 by viruses of the necrotic ring spot [peach ring spot: cf. **37**, p. 727] group.

Harrison (B. D.). **Further studies on Raspberry ringspot and Tomato black ring, soil-borne viruses that affect Raspberry.**—*Ann. appl. Biol.*, **46**, 4, pp. 571–584, 1 pl., 1958.

At the Scottish Horticultural Research Institute, Invergowrie, Dundee, raspberry ring spot [Scottish leaf curl virus] [cf. **37**, pp. 669, 697] was isolated from 7 raspberry vars., 7 weed spp., and sugar beet all from eastern Scotland. More than 50 outbreaks of the disease have been seen in the area (6 counties). The virus was more readily transmitted to *Chenopodium amaranticolor* by sap inoculation from diseased raspberry than to other spp. It was distinguished from tomato black ring virus [loc. cit.], raspberry yellow dwarf [loc. cit.], tobacco ring spot [cf. **37**, pp. 185, 509, *et passim*], and cucumber mosaic [cf. **38**, p. 19] viruses by the symptoms induced on *C. amaranticolor*, French bean [*Phaseolus vulgaris*], tobacco, and *Petunia hybrida* and by its behaviour in serological and plant-protection tests. It lost infectivity when diluted 10^{-4}, kept for 3 weeks at 18° C., and when heated for 10 min. at 70°, but not at 66°; it was precipitated without inactivation by ammonium sulphate, ethanol, and acetone, and was inactivated at pH 3.

Scottish leaf curl virus was recovered from raspberry plants and beet ring spot

strain of tomato black ring virus [**37**, pp. 194, 697] from sugar beet seedlings grown under glass in soil from 5 fields where leaf curl was present; incidence of infection differed in different soils, but infection by each virus was favoured by the same samples of soil. No sugar beet was infected by leaf curl and no raspberry by black ring. Infection by the latter was similar in soil collected at different times of the year. Treatment with 350 ml. 0·8% formaldehyde or 200 ml. 0·1% parathion/6-in. pot made soil non-infective. Virus could not be isolated from soil extracts, and watering sterilized soil with virus suspensions or growing artificially infected plants therein failed to make it infective, which indicated that infection depends on some factor other than free virus, possibly the presence of an organism.

Lister (R. M.). **Preparation of virus antisera from Strawberry.**—*Nature, Lond.*, **182**, 4652, p. 1814, 1958.

It was found at the Scottish Horticultural Research Institute, Invergowrie, Dundee, that it was not necessary to use non-rosaceous hosts when preparing antisera to some viruses from rosaceous plants, because of the presence of inhibitory tannins [**37**, p. 697]. Mature leaves of field strawberry plants infected by raspberry ring spot [Scottish leaf curl] virus or by raspberry yellow dwarf virus were shredded, thoroughly ground in a mortar with an equal weight of 5% nicotine base and coarse carborundum powder, and the liquid expressed by squeezing through muslin. It was clarified by slow speed centrifugation and dialysed against running tap water overnight, to remove excess nicotine, and then against 0·85% saline. Rabbit antisera were of moderately high titre—about 1/256—measured by precipitin tests against clarified sap from infected leaves of *Petunia hybrida*. The viruses in preparations made in this way did not give a visible precipitate when incubated with their homologous antisera, but did so only if concentrated after precipitation with acetone. Such preparations made from Huxley strawberry infected by Scottish leaf curl virus contained high yields of virus, as shown by assay on *Chenopodium amaranticolor*.

Singh (M. P.). **A probable mineral deficiency in Mango under field conditions.**—*Hort. Advance*, **1**, 1, pp. 48–54, 8 pl. (1 col.), 1957.

The author describes the development of tipburn and marginal necrosis of the leaves of young grafted mango plants of the var. Dashehari at the Horticultural Research Institute, Saharanpur, U.P., India, comparing the symptoms with those of mineral deficiency in pot culture. Old trees may show, in addition, a triangular green wedge along the midrib and small necrotic areas scattered over the leaf surface. It is concluded that all these symptoms are expressions of P deficiency, induced or aggravated by low Mg. (cf. Smith & Scudder, *Proc. Fla hort. Soc.*, **64**, pp. 243–248, 1951).

Diseases of the Papaw.—*Agric. Gaz. N.S.W.*, **69**, 10, pp. 534–538, 5 fig., 1958.

Descriptions are given of the diseases, references to which have been noticed from time to time [cf. **23**, p. 448 *et passim*], and control. They include powdery mildew (*Sphaerotheca* sp.), dieback [loc. cit.], yellow crinkle [str. of tomato big bud virus: **29**, p. 36], root rot (*Phytophthora palmivora*) [**37**, p. 415], black spot and stem rot (*Ascochyta caricae*) [cf. **34**, p. 606], and ripe fruit rot (*Gloeosporium* spp.) [loc. cit.].

Pruthi (J. S.), Srivastava (H. C.), & Lal (G.). **Microbiological spoilage in purple Passion Fruit (Passiflora edulis Sims.) during storage.**—*J. sci. industr. Res.*, **17**C, 8, pp. 129–131, 1958.

At the Central Food Technological Research Institute, Mysore, India, decay caused by *Penicillium expansum*, *Aspergillus niger*, *Fusarium oxysporum*, and *Rhizopus nigricans* [*R. stolonifer*] was effectively controlled by packaging and storage of the fruit in polyethylene bags and wooden crates treated with 5% lysol solution.

Nirvan (R. S.). **Control of dry rot of Persimmon (Diospyros kaki) seeds.**—*Hort. Advance*, **1**, pp. 62–64, 1 pl., 1957.

Poor germination of persimmon seed, noticed over a long period at the Horticultural Research Institute, Saharanpur, U.P., India, appeared to result from a dry rot infection. A *Penicillium* sp., isolated from affected seed, produced in culture sporophores similar to those seen on the seed, and the characteristic rot symptoms were reproduced by inoculation of sound and injured seed. In a laboratory test agrosan completely prevented infection in spore-inoculated seed, though infection in untreated was 53·2% and in ceresan-treated 26·6%. The corresponding figures in a nursery experiment were: agrosan (5 oz. to 1 cwt. seed) complete control, ceresan (seed and soil treatments) 10 and 23, and untreated 42% infection.

Pettinari (Carla M.). **Primo contributo alle ricerche su Cycloconium oleaginum Cast. e sul comportamento del parassita in Oliveti del Lazio.** [First contribution to researches on *C. oleaginum* and the behaviour of the parasite in the Olive groves of Lazio.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (*1957*), 2, pp. 215–239, 1958. [English summary. 90 ref.]

The author recapitulates the literature dealing with the infection of olive trees by *C. oleaginum* [**36**, p. 39] and describes preliminary studies on control by fungicidal spraying, climatic conditions in relation to date of infection, the duration of the incubation period, and the biological characters of the fungus [cf. **37**, p. 671].

Spraying with neutral Bordeaux mixture (1·5%) in March and again in Oct. gave good protection (0·1% infected leaves, 0·5 of a spot/100 leaves) in Dec., though infection on the untreated trees was not serious. Dithane Z-78 lost its original effectiveness and in Dec. there were 5% infected leaves (av. 15 spots/100 leaves); SR 406 gave fair protection, but new infections were apparent 1 month later.

Further observations confirmed that the average incubation period in the leaf is 15 days. This period is shortened when the prevailing air temp. favours the fungus and rain follows penetration. Tests confirmed the observation that brief periods of intense cold make germination more prompt and probably accelerate the maturation of the conidia. Conidia submitted to low temps. before germination penetrated the cuticle slightly more rapidly than others, the difference in time required averaging 1 hr. Conidia not exposed to low temps. before germination required over 36 hr. to penetrate at 5°, 24–36 hr. at 12°, and 18 hr. at 18°; at 24°, humidity being much higher, penetration occurred after 14 hr. From other evidence, it is concluded that exposure to a moderate degree of cold for moderate periods increases the vigour of the conidia.

Zachos (D. G.). **A spotting of Olive fruits caused by Pseudomonas savastanoi (E. F. Smith) Stevens.**—*Ann. Inst. phytopath. Benaki*, **1**, 4, pp. 159–170, 8 fig., 1958.

A detailed account is given of *P. savastanoi* and its appearance on olive fruit in contrast to the more usual infection of other parts of the tree [cf. **37**, pp. 132, 671]. During 1957 this new symptom appeared in olive groves on the coast of Greece from Almyros to Stylis, in the Amphissa region, and in the Sporades and Euboae islands; starting in June, it was intensified by an unusually wet autumn.

Mohanty (N. N.) & Das (S. N.). **Leaf spot of Safflower.**—*Sci. & Cult.*, **24**, 6, pp. 284–285, 1 fig., 1958.

The causative agent of a severe leaf spot of safflower observed at the Cotton Research Station, Chakuli, in Feb. 1958 was identified as *Ramularia carthami* [**7**, p. 165], apparently a new fungus record for India. The conidiophores measured 24–81 × 3–5 μ and the conidia 24–25 × 4·5–6 μ.

Varadarajan (P. D.). **Alternaria tenuis on Rauwolfia serpentina.**—*Sci. & Cult.*, **24**, 5, p. 231, 1 fig., 1958.

Infection by *A. tenuis* of *R. serpentina* and 5 related spp. growing in greenhouses at the Morris Arboretum, Philadelphia, during summer 1956, was invariably associated with a heavy infestation by mealy bugs (*Pseudococcus* sp.), which carried spores and fragments of mycelium on their bodies and waxy appendages. Initially the fungus became established in the honey dew on the leaves and stems and then spread after about 1 week to other parts of the plant, causing the leaves to curl and the inflorescences to dry, but it did not appear to penetrate the leaf tissues.

Mohanty (N. N.). **Target spot of Rauwolfia serpentina Benth.**—*Sci. & Cult.*, **23**, 11, pp. 608–609, 1 fig., 1958.

In Sept. 1956 a leaf spot disease widely prevalent on *Rauwolfia serpentina*, grown for experimental purposes at the State Agricultural Station, Bhubaneswar (Orissa), India, was caused by *Corynespora cassiicola*.

Annual Report of the Department of Agriculture, Jamaica, for the year ended 31st December, 1956.—63 pp., 1 pl., 1958. 3*s.* 6*d.*

Some of the information in the report of the plant protection division (pp. 34–38) [cf. **37**, p. 7] has already been noticed. The 'unknown disease' or lethal yellowing of coconuts [**35**, p. 366] was observed for the 1st time in St. Ann parish and has continued to spread slowly in the W. of the Island. The 'frond drop' disease, though severe only at Bengal, St. Ann, was present also in scattered plantations elsewhere. Of several treatments tried to check root rot of coconuts [**36**, p. 317] in Portland, dieldrix applied after removal of diseased roots, followed by earthing up, has shown promise.

Verghese (E. J.), Shankaranarayanan (M. P.), & Menon (K. P. V.). **A note on the strontium content of Coconut leaves and soils in relation to 'leaf' and 'rot' (wilt) diseases of Coconuts in Travancore and Cochin.**—*Indian Cocon. J.*, **10**, 2, pp. 25–31, 2 pl., 1957.

Representative samples of coconut leaves and soils were analysed spectrographically for strontium at the Central Coconut Research Station, Kayangulam, Travancore, India. On an average, the leaves from healthy trees contained under 0·28 p.p.m. Sr and those from trees with leaf and root (wilt) disease [**38**, p. 23] under 0·21 p.p.m. The possible relation of strontium to this disease is discussed and considered unlikely [**31**, p. 383].

Broadbent (L.), Burt (P. E.), & Nix (J. S.). **The cost of using insecticides to maintain the health of Potato seed in England and Wales.**—*N.A.A.S. quart. Rev.* 38, pp. 144–152, 1957.

Details and costings are given of alternative methods by which seed potatoes may be grown and protected from virus infection (mostly leaf roll and Y) by any one of the spraying procedures outlined [cf. **38**, p. 158]. The annual cost of spraying and roguing is £8–11*s.*/acre less than that of planting new 'A' or stock seed. The cheapest method is to spray and rogue part of the ware crop and save seed from this.

Khanna (M. L.) & Ganguly (B.). **Analysis of virus contents of some Indian and exotic Potatoes for virus 'X' and 'Y'.**—*Sci. & Cult.*, **24**, 6, pp. 285–288, 8 fig., 1958.

Commercial vars. of potatoes, comprising 27 Indian, 60 Chilean, 320 exotic vars. and hybrids, and 25 Russian hybrids from a major collection maintained at the Central Potato Research Institute, Simla, were analysed for their virus contents and grouped according to the different symptom pictures obtained on infection with virus X, virus Y, and the rugose (X+Y) complex.

Gabriel (W.). **Études sur les vecteurs des maladies à virus de la Pomme de terre en Pologne.** [Studies on the vectors of Potato virus diseases in Poland.]—*Parasitica*, **14**, 4, pp. 119–134, 3 graphs, 1958.

After pointing out that in central Poland the potato diseases caused by virus Y (mosaic and streak) [**37**, p. 368] are much more prevalent than potato leaf roll, and noting that *Myzus persicae* is not the only insect vector of potato virus diseases in Poland, the author describes experiments conducted at the Research Station, Reguly (near Warsaw), during 1955–58 to investigate the relationship between the spread of these diseases and the numbers of aphids present during the growing period and the variation in the aphid populations on 3 potato vars. planted in 2 different soils on 5 different dates. The results obtained clearly demonstrated that *Aphis nasturtii* and *A. frangulae* together are mainly responsible for the spread of potato viruses in central Poland.

Bercks (R.). **Serologischer Nachweis von Viren in der Kartoffelpflanze.** [Serological demonstration of viruses in the Potato plant.]—Reprinted from *Kartoffelbau*, **9**, 7, 1 p., 1958.

A popular note emphasizing the difficulty of diagnosing potato virus Y infection of potato, due mainly to the low concentration. The use of eye cuttings under controlled conditions is recommended [cf. **36**, p. 552].

Tahon (J.). **Sur une technique histologique d'identification de l'enroulement de la Pomme de terre. (Solanum virus 14).** [On a histological technique for the identification of Potato leaf roll. (*Solanum* virus 14).]—*Parasitica*, **14**, 3, pp. 107–114, 1958.

A full account is given of experiments conducted at the Laboratoire de Phytovirologie, Gembloux, Belgium, to test the value of Baerecke's method for detecting potato leaf roll virus by staining sections of tubers or stems with resorcin blue (*Züchter*, **25**, 10, pp. 309–313, 1955). In the 1st experiment the results of field diagnosis were compared with those given by stained stem sections; a 2nd experiment tested the value of diagnosis from stained tuber sections. In the 3rd and principal experiment 4 methods were compared: (*a*) observations of symptoms in the field up to maturity; (*b*) sections from the tubers; (*c*) symptoms on glasshouse plants for a period of 80 days after emergence; and (*d*) sections made on several occasions between the 2nd and 3rd internode after 40 days' growth. It became apparent that the result obtained by any one method must always be confirmed by another, but Baerecke's technique possesses highly interesting possibilities.

Day (M. F.) & Zaitlin (M.). **Infectivity and electron microscopy of extracts of Physalis floridana plants infected with Potato leaf roll virus.**—*Phytopath. Z.*, **34**, 1, pp. 83–85, 1958. [German summary.]

At the Divisions of Entomology and Plant Industry, Canberra, Australia, preparations of potato leaf roll virus from *P. floridana* [cf. **38**, p. 25] were still infectious (as evidenced by *Myzus persicae* transmission) after 24 hr. at 3° C. and pH 7 but not after 48 hr. After 2 days' continuous electrophoresis no infective fraction was found. The rods detected under the electron microscope by Sprau and Heinze [**35**, p. 388] were not present in the author's preparations. The virus proteins apparently constitute only a small part of the total proteins of this preparation and are not easily detectable with the electron microscope.

Bercks (R.), Gehring (F.), & Follmann (G.). **Die Nachbauverhältnisse pseudo-aucubavirus-kranker Kartoffelsorten.** [The behaviour of the progeny of Potato varieties with pseudo-aucuba virus disease.]—*Phytopath. Z.*, **34**, 1, pp. 107–108, 1958. [English summary.]

Serological and inoculation tests at the Institut für Landwirtschaftliche Virus-

forschung, Brunswick, suggested that the progeny of 5 potato vars. infected by pseudo-aucuba virus [tobacco ring spot virus: **35**, p. 481] soon become healthy.

Ramson (A.) & Janke (C.). **Das Luzernemosaikvirus als Erreger einer Gelbfleckigkeit des Kartoffellaubes.** [Lucerne mosaic virus as the cause of a yellow spotting of Potato foliage.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **12**, 9, pp. 173–179, 1 pl., 1958. [Russian and English summaries.]

Lucerne mosaic virus is reported for the 1st time on potatoes [cf. **35**, p. 483] in Germany. The isolate, obtained in 1953 from Aquila in an experimental field at the Biologischen Zentralanstalt, Berlin, was identified from host range studies, physical properties, and transmission by *Myzodes* [*Myzus*] *persicae*.

Grümmer (G.). **Ausbruch und Verlauf der Krautfäule-Epidemie in Greifswalder Kartoffelbestände während der Jahre 1952–1957.** [Outbreak and course of the haulm blight epidemic in Potato stands at Greifswald in the years 1952–57.] —*Wiss. Z. Ernst Moritz Arndt Univ.*, **7**, M.-n. R. 1–2, pp. 41–53, 8 graphs, 1957–8.

None of the methods for determining 'critical days' [**13**, p. 468; **14**, p. 715; **30**, p. 537; **37**, p. 553] (and F. Bolle, *NachrBl. dtsch. PflSchDienst, (Braunschw.) Stuttgart*, **4**, 11, pp. 168–170, 1952) gave reliable forecasts of outbreaks of *Phytophthora infestans* on potato [**38**, p. 159] at the Institut für Agrobiologie der Universität Greifswald, Germany, over the period mentioned. However, in late potatoes outbreaks were not encountered until the total wt. of tubers/hill was 150 g. or more. For early vars. the critical wt. was 200 g. though light infections were seen on the foliage earlier. In future, warnings will be given locally when the tubers have reached the critical wt., the fungus is sufficiently prevalent, and damp, warm weather is forecast.

Bakthavathsalu (C.) & Balasubramanian (C.). **Forecasting early blight of Potato at Nanjand.**—*Sci. & Cult.*, **23**, 11, pp. 613–615, 2 graphs, 1958.

At the Agricultural College and Research Institute, Coimbatore, India, the daily rainfall and mean daily temp. for the main potato crop season (May–Aug.) at Nanjand for 1927–55 were plotted on 7-day moving graphs for blight (*Alternaria solani*) and non-blight years. The mean temp. during blight years was mostly above 60° F. The 7-day av. rainfall (1·69 in.) is favourable for the disease. It was found that predictions based on 10-day moving temp. [**33**, p. 752] and rainfall proved to be accurate.

Synchytrium endobioticum (Schilb.) Perc. Potato wart disease in Europe and the Mediterranean Basin in 1957.—xv+19 pp., Paris, European and Mediterranean Plant Protection Organisation, 1958. [With French version. Mimeographed.]

A general appraisement of the present state of knowledge regarding potato wart disease (*Synchytrium endobioticum*) [cf. **36**, p. 718], based largely on information made available at the International Conference on Potato Wart Disease held at Smolenice, Czechoslovakia, 4–7 Nov. 1958, is followed by a tabular summary of the information on incidence, intensity, localities infected for the 1st time in areas previously unaffected, spread or regression, new races of the fungus, and the results of selection of resistant vars., received from European and Mediterranean countries (listed in alphabetical order) in reply to a questionnaire.

In papers presented to the Conference J. Zakopal and B. Spitzova considered that the factor limiting the occurrence of the disease in the warmer parts of Czechoslovakia is soil temp.

In experiments in Czechoslovakia, when severely infected potatoes of a susceptible var. were transplanted to dry, hot areas the disease developed in a mild

form and usually disappeared completely in a year or two [**37**, p. 304]; this position may, however, change. V. Bojňanský has stated that no biotype adapted to warm, dry areas has yet been found, and it is not known whether for these localities such biotypes would be more dangerous than normal ones.

In a new method of testing for resistance in the laboratory [**38**, p. 238] whole tubers are immersed in water for 4–6 hr. at 8–15° C., the terminal eye being covered with 1 g. of growing wart tissue 3–6 weeks old. The tubers are then covered with a soil-sand mixture and kept 3–4 weeks at 12–15° and 60% humidity.

No confirmation was obtained of the presence of a new biotype in N. Italy [cf. **37**, p. 554]. The only biotype present in Czechoslovakia is thought to be identical with the Dahlem or normal biotype [**36**, p. 781]. In the U.S.S.R. geographical differences in symptoms appear to concern susceptible vars. only, and the statement in the 1956 report that new biotypes had been recorded in U.S.S.R. should, therefore, be withdrawn. There is no doubt, however, about the occurrence of different races in Germany [loc. cit.], where workers have concluded that the difference between biotypes is determined by the range of vars. attacked and not by the severity of the attack; hence, the term 'aggressive' is not appropriate to the new strains. Breeding for immunity from the new biotypes has made advances.

In the U.S.S.R. [**37**, p. 593] isolated pockets of infection are eradicated with chloropicrin applied at 250–400 g./sq.m. In Czechoslovakia encouraging results have been obtained with sodium DNOC [**38**, p. 238], watering with a 2% solution of 25% DNOC giving the best results; dusting was satisfactory at the rate of 10 kg./are, when the soil was sufficiently humid. Ammonium DNOC was equally effective. A 50% DNOC dust at 75 g./sq.m. reduced infection by 90%, but the potato yield was also decreased considerably. When the compound was used as a dust at 50 g./sq.m. or as 50 g. of paste/5 l. water/sq.m., the number of infected tubers was reduced by 60 and 75%, respectively.

Malcolmson (Jean F.). **A consideration of the species of Phoma which parasitize Potatoes.**—*Trans. Brit. mycol. Soc.*, **41**, 4, pp. 413–418, 1 pl., 1958.

Studies by the Agricultural Research Council Potato Storage Investigation, Sutton Bonington, Leics., of 400 *Phoma* isolates from potato tubers from Britain and U.S.A. and cultures of *P. solanicola*, *P. tuberosa*, and *P. foveata* [**37**, p. 3] indicated that the 3 should be regarded as 1 sp., *P. solanicola* [**25**, p. 526], while *P. eupyrena* (as interpreted by Wollenweber), the pathogenicity of which to potatoes is doubtful, is regarded as a separate sp.

Pratella (G.). **Rapporti fra la rizoctoniosi della Patata e quella della Barbabietola.** [The relationships between the *Rhizoctonia* disease of the Potato and that of Sugar Beet.]—*Ann. Sper. agr.*, N.S., **12**, 4, pp. 1299–1303, 4 pl., 1958. [English summary.]

At the Laboratorio Sperimentale di Patologia Vegetale, Bologna, 14 strains of *R.* [*Corticium*] *solani* from sugar beet and 8 from potatoes from different parts of Italy, inoculated into potato tubers, all developed similar growth, but when inoculated into the roots of sugar beet, only the beet strains grew.

Nath (V. R.), Vaheeduddin (S.), & Reddy (D. P.). **Bacterial wilt (ring disease) of Potato in Hyderabad.**—*Sci. & Cult.*, **23**, 11, pp. 605–606, 1958.

During a disease survey in 1955 by the Division of Plant Pathology, Main Experimental Station, Himayatsagar, Hyderabad, wilting of potato in various stages caused by *Pseudomonas solanacearum* [**36**, p. 662] was noticed. This was the 1st time potato ring disease had been noted in the State. The var. Up-to-date imported from Simla was severely affected over an area of 25–30 acres and loss was estimated at 20–25%.

Gigante (R.). **Alterazioni dei tuberi di Patata causate da eccesso di umidità** [Abnormalities of Potato tubers caused by excess humidity.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (*1957*), 2, pp. 275–284, 7 fig., 1958. [English summary.]

A description is given of various abnormalities (including changes in shape, cracks and cavities, simple and complex outgrowths, and a reticulated cork formation on the skin) induced in potato tubers of different vars. near Fucino, Italy, in 1956, by sudden increases in the soil water-content due to excessive and irregular irrigation while the tubers were forming.

Newsam (A.). **Pathological Division.**—*Rep. Rubb. Res. Inst. Malaya, 1953*, pp. 49–58, [1958]; *1954*, pp. 49–58, [1958].

The 1st of these reports [cf. **34**, p. 396], both issued in a new format after a hitherto restricted circulation, notes evidence that the reduced growth rate of *Fomes lignosus* caused by culture filtrates of *Botryodiplodia theobromae* was due to inhibitory substances in the latter, particularly in an acid medium. Additional support was obtained for the view that stumps of healthy rubber trees can become infected by wind-borne spores of *F. lignosus*.

Reports were received of 89 outbreaks of secondary leaf fall [cf. **34**, p. 397] in Feb.–May, inclusive; most were in March and none were received in Jan. or June. In 286 samples of affected material, 93% were associated with *Oidium heveae*, 29% with *Gloeosporium alborubrum*, and many with insects.

In further aerial spraying trials to test defoliants which might be used should S. American leaf blight [*Dothidella ulei*] appear in the area, one on flat land, to observe the effects of 1, 2, and 3 applications of 5, 7, and 10% normal butyl 2,4,5-trichlorophenoxyacetate in Shell diesoline, showed that effectiveness increased with increased dosage, the lowest conc. giving poor results; even at 1 gal./acre application was necessary every month. In a 2nd test over hilly ground no important difference was found between the ground recovery from a level run at approx. 280 ft. (30 ft. above the highest tree tops) and that from a run flying as nearly as possible 30 ft. above the trees. The area was sprayed once with 10% of the ester, 1 gal./acre. Both methods gave almost complete defoliation.

In the 2nd report it is stated that with better methods of stump poisoning the incidence of root disease (*Fomes noxius*, *F. lignosus*, and *Ganoderma pseudoferreum*) [cf. **37**, p. 507] is only $\frac{1}{3}$–$\frac{1}{4}$ of that in the untreated. In the experiment on pre-planting eradication the sections where all the old trees were winched over had, at the time of writing, the highest incidence of disease. The benefits from stump poisoning had not become apparent. Poisoning standing trees, however, greatly reduced incidence in the young stand. In a fundamental investigation of *F. lignosus* by R. A. Fox, the evidence obtained suggested that the fungus may itself produce antibiotic substances. Growth of rhizomorphs is by progressive thickening of strands within a diffuse terminal fan of mycelium, the susceptibility to desiccation of which explains why rhizomorphs cannot develop in exposed situations.

Tests with various materials against mouldy rot [*Ceratocystis fimbriata*: **38**, p. 32] showed that the tar fungicide agrisol vulcan red was satisfactory at 5–10% conc. In small-scale trials paranitrophenol 0·1% and dioctyl sodium sulphosuccinate at 5% gave promising results. Standard Vacuum product 2295-C, containing 5% of a neutral tar oil fraction, caused abnormal proliferation of the outer bark. Against black stripe [*Phytophthora palmivora*: cf. **38**, p. 99] the careful excision of affected tissue had little effect, though it may still be desirable to remove the large burrs on the panel that are caused by old infections. It appears to be unnecessary to stop tapping affected trees if spraying can be continued until the end of the wet season. From Jan.–May, inclusive, there were 89 outbreaks of secondary leaf fall and in the specimens received in Mar. *O. heveae* was the dominant parasite.

Immersion of imported brown budwood with waxed ends in 0·2% $HgCl_2$ in 50% methyl alcohol (against possible introduction of *D. ulei*) can safely be prolonged for periods of up to 1 hr., the budwood either being used immediately or stored for a week before or after. Storage improved the chances of budding success.

MUNGOMERY (R. W.). **Report of the Division of Entomology and Pathology.**—*Rep. Bur. Sug. Exp. Stas Qd* 58, pp. 75–95, 17 fig., 1958.

The measures taken against sugarcane ratoon stunting virus [**38**, p. 32] have been amply justified by the improved yields. As many of the cleaned stocks are now beginning to show signs of infection, renewal every 2 or 3 yr. is advised.

There was a marked increase in Fiji [virus] disease, 133 infected stools on 7 farms being found.

In the section on disease investigations (pp. 88–95) [cf. **37**, p. 308] C. G. HUGHES notes that ratoon stunting virus was still viable in *Imperata cylindrica* and *Sporobolus capensis* after 2 yr., but not in other grasses inoculated [**37**, p. 181]. Contaminated knives stored in the shade were 100% infective on the 1st day, 14% on the 4th, and not at all on the 7th. The vars. Q. 50 and C.P. 29/116 showed general resistance to the disease in yield trials.

Bacterial mottle [**37**, p. 596], now attributed to *Pectobacterium carotovorum* var. *atrosepticum* [*Erwinia carotovora* var. *atroseptica*], has been found on N.Co. 310, P.O.J. 2878, and Pindar; Trojan is less susceptible than Q. 57 and Q. 66. Symptoms have been observed on *Imperata cylindrica* and *Paspalidium* sp., but the pathogen could not be isolated [cf. loc. cit.]. The disease may be essentially one of native grasses rather than of cane; maize, sorghum, and Sudan grass have been inoculated successfully.

In a trial for resistance to *Sclerospora sacchari* Q. 67 showed 47% stalk infection, K 338, 100, P.O.J. 2878, 22, Trojan, 16, and Vesta, 20. Examination of breeding material has shown that resistance to *Xanthomonas albilineans* [**37**, p. 595] may be conferred by Co 290 and P.O.J. 2878. *Helminthosporium sacchari* [**30**, p. 581] was more prevalent than usual in 1957 and 1958; Q. 58, 61, 68, and 70 were as susceptible as Q. 50, while Q. 28, 47, 57, 59, and 64 proved comparatively resistant. Q. 66 and Q. 67 were susceptible to sugarcane mosaic virus.

HUGHES (C. G.). **A miscellany of Sugar-cane diseases.**—*Tech. Commun. Bur. Sug. Exp. Stas Qd* 1, 20 pp., 17 fig., 1958.

A condition observed in a field of Q. 49 at S. Bingera, Bundaberg district, is described, resembling the spike disease recently noted in India [**37**, p. 57], with the additional symptoms of extensive galls on stems and leaf sheaths and hypertrophy of the nodal root bands.

A stool of N.Co. 310 at the Mackay Sugar Experiment Station showed symptoms somewhat resembling sembur [**35**, p. 634], but the disease is considered to be distinct. Progeny from the stool developed dwarfing of the leaves, yellowish or necrotic lesions originating in the spindle, and a fan-like top, affected shoots never exceeding 3 ft. in height.

A stool of Q. 13 at the Northern Experiment Station was observed with abnormal freckling accompanied by stem cankering and some loss of vigour. The symptoms are suggestive of streak and have appeared in an adjacent crop of P.O.J. 2878, but have not been transmissible mechanically.

Spindle stripe [**34**, p. 631] is described in greater detail.

Various types of freckling and spotting are described. S.J. 16 is regularly spotted and Q. 28 typically shows a dense, red freckling of individual leaves. Odd stools of Trojan are occasionally freckled light yellow-green with small red dots; Q. 50 may also on occasion show unusual freckling, either very fine or tending to aggregate.

Two types of blotch occur sometimes on N.Co. 310, one large, the other small. A stool of Vesta produced a highly coloured red and yellow blotch, 1 cm. × 6 mm.; small, brightly coloured blotches are observed occasionally on S.J. 16.

In a planting of Q. 50 in the Mackay district young leaves in the autumn develop a dull-red colour spreading up the blade, with chlorotic areas; as winter comes many leaves snap at the dewlap and hang down; there is also some necrosis of the spindle, which is mostly chlorotic. Normal growth is resumed during summer in ratoons, but the symptoms appear again in autumn.

Steib (R. J.). **Control of the ratoon stunting disease of Sugarcane in Louisiana with hot-air during the past three seasons.**—*Sug. Bull., N. Orleans*, **36**, 22, pp. 303–306, 1958.

In 1958 the average percentage of ratoon stunting virus infection remaining in treated canes of vars. C.P. 44–101, C.P. 36–105, and C.P. 43–47 after treatment in electric hot-air ovens [**38**, pp. 33, 225, and below] was 17, compared with 2·9 in 1956 and 9·7 in 1957. The fact that 100% control was obtained at 22 out of 56 locations indicates that the incomplete eradication at the others was due to the failure of individual operators to follow the recommendations for treatment. In addition to those already issued, the following precautions are advocated to ensure maximum disease control. C.P. 44–101 should be subjected to a temperature of 59° instead of 58° C. The difficulty of eliminating infection from this var. and C.P. 43–47 is attributed to their erect habit, causing very tight stacking on the rack, and it is advisable to stack the stalks very loosely to secure the maximum passage of air between them. A 2-in. space between the uppermost layer of cane and the pipe immediately above it is essential for the proper diffusion and passage of air. The stalks must be at least 1 ft. away from the air deflectors situated at the back of the oven, so that the air may fan out before entering the stack. The cane should be hand-cut and -cleaned, leaving no loose or hanging debris. An extra row of pipes should be added to the rack to accommodate canes that are too short to reach the entire length of the rack. The oven should begin to cycle at 58 or 59° after $3\frac{1}{3}$ hr., since the cane must be exposed for at least $4\frac{1}{2}$–5 hr. to the correct in-going air temperature after that of the oven is adjusted.

Steib (R. J.), Forbes (I. L.), & Chilton (S. J. P.). **Controlling ratoon stunting disease.**—*Sug. J., N. Orleans*, **21**, 1, pp. 22–23, 26, 28, 1 fig., 1958.

An expanded, fully tabulated survey is given of the results of experiments in Louisiana during 1955–57 on cane treatment in electric hot-air ovens [see above].

Abbott (E. V.). **Strains of Sugarcane mosaic virus in Louisiana.**—*Sug. Bull., N. Orleans*, **37**, 4, pp. 49–51, 1958.

The detection of a strain of sugarcane mosaic virus, which may be either new and undescribed or identical with F, quiescent since 1934 when it was isolated from C.P. 807, was announced at the June (1958) meeting of the Contact Committee of the American Sugar Cane League, held at Houma, Louisiana [cf. **35**, p. 352]. The history of the disease in the State is recapitulated, with special reference to the different strains [**35**, p. 489]. The commercial importance of this new development cannot yet be predicted, but danger lies both in its pathogenicity to the normally resistant C.P. 44–101 and in the increase in acreage of the susceptible N.Co. 310. Furthermore, the susceptible C.P. 52–68 will begin to appear in commercial plantings during 1959.

The best insurance against extensive spread of the virus is the roguing and destruction of diseased stools, beginning towards the end of Apr. or early May at the latest. The fields should be rogued at least twice and preferably 3 times at fortnightly intervals.

Srinivasan (K. V.). **Fungi of the rhizosphere of Sugarcane and allied plants. I. Hyalostachybotrys gen. nov.**—*J. Indian bot. Soc.*, **37**, 3, pp. 334–342, 22 fig., 1958.

Among fungi isolated at the Sugarcane Breeding Institute, Coimbatore, India, were some resembling *Stachybotrys* [**24**, p. 389] in form, but lacking colour. A new genus, *Hyalostachybotrys*, is proposed with 2 spp. The type, *H. bisbyi*, was isolated from the rhizospheres of *Erianthus munja* and *E. arundinaceus*; *H. sacchari* was isolated from sugarcane sheaths on which it is a weak pathogen and also from the rhizosphere; an isolate which probably represents a degenerate form of *H. sacchari* was also obtained from the rhizosphere.

Wolffgang (H.) & Keck (A.). **Untersuchungen über den Stoffwechsel viruskranker Pflanzen. I. Die Phosphatase-Aktivität in Nicotiana tabacum L. var. Samsun nach Infektion mit TMV.** [Studies on the metabolism of virus-diseased plants. I. The phosphatase activity in *N. tabacum* var. Samsun after infection with TMV.]—*Phytopath. Z.*, **34**, 1, pp. 57–65, 5 graphs, 1958. [English summary.]

At the Institut für Phytopathologie, Aschersleben, Germany, the phosphatase activity of tobacco plants sap-inoculated with a yellow strain of tobacco mosaic virus [**37**, p. 678] showed 2 max., at pH 6 and pH 8, with a min. at 6·6–6·8. At the 1st max. the PA was 65% higher in infected than in healthy leaf extract. It was invariably higher in infected plants and was highest in young diseased leaves, the values for roots, older leaves, and stems being considerably less; it increased in the morning and decreased in the evening, the heavy increase after sap inoculation being enhanced in plants treated with sap of healthy plants. Later there was a strong decrease. The fluctuations occurring at first decreased during the first days after infection.

Elbertzhagen (H.). **Ein Beitrag zum Stickstoff- und Phosphatstoffwechsel mosaikviruskranker Tabakpflanzen.** [A contribution to the nitrogen and phosphate metabolism of mosaic virus infected Tobacco plants.]—*Phytopath. Z.*, **34**, 1, pp. 66–82, 17 graphs, 1958. [English summary.]

Analyses at the Botanischen Institut, University of Munich, showed that the leaves of Samsun tobacco plants primarily infected with potato virus X [**37**, p. 509] or tobacco mosaic virus [**38**, p. 35] had a higher content of dry matter, total and soluble N, nucleic acids, and proteins. The insoluble phosphates were only temporarily increased at the time of max. protein and nucleic acid synthesis. Total phosphate showed no significant increase, but soluble phosphate was considerably lower than in the healthy controls. There was also increased respiratory activity and an increase at first in photosynthesis.

Wittmann (H. G.). **Untersuchungen über die Wirkung des Cytovirins auf Virusvermehrung und Wirtswachstum.** [Studies on the action of cytovirin on virus multiplication and host growth.]—*Phytopath. Z.*, **34**, 2, pp. 221–227, 1 graph, 1958. [English summary.]

At the Max-Planck Institut für Biologie, Tübingen, Germany, young Samsun and Java tobacco plants were inoculated in the greenhouse with highly purified tobacco mosaic virus, *vulgare* strain, at 1×10^{-6} g./ml., which produced systemic symptoms in both. The cytovirin [cf. **38**, p. 314] at $0{\cdot}5–5 \times 10^{-6}$ g./ml. water was atomized on to all the leaves 15 min. and 3 days after inoculation. Care was taken that no water came into contact with leaves for 12 hr. after spraying. The greenhouse temp. was 20–25° C. in the daytime and 18–20° at night.

It was demonstrated statistically that the chemical was completely inhibitory to virus multiplication only at a conc. not very much below toxicity. Its action decreased the greater the interval between inoculation and spraying. With the

same interval, spraying before inoculation was more effective than after. The effect up to 6 hr. was so pronounced that in some plants no symptoms developed up to several weeks after inoculation.

Hirai (T.). **Intracellular evidence of the inhibition of Tobacco mosaic virus multiplication by antiviral substances.**—*Virology*, **6**, 3, pp. 732–742, 1 pl., 2 graphs, 1958. [23 ref.]

At Nagoya University, Anzyo, Japan, when Turkish tobacco leaves inoculated with the ordinary strain of tobacco mosaic virus were floated on Vickery's nutrient solution, the following sequence of inclusion formation usually occurred: granular X-body, vacuolate X-body, incomplete crystal, complete crystal [**38**, p. 34]. The granular X-body stage coincided with a period of excess nucleic acid during the 1st 2 days. Thiouracil [cf. **37**, p. 461] and benzalacetone thiosemicarbazone (BATS) [**38**, p. 163] delayed or suppressed the appearance of the inclusions. Thiouracil delayed the appearance of the granular X-body until the 6th day, suppressed crystal formation, prevented the formation of the excess nucleic acid, and reduced the subsequent deficiency of it. BATS delayed the granular X-body stage until the 4th day.

McLeod (A. G.) & Thomson (R.). **The effect of several fungicides on stem rot of Tobacco.**—*N.Z.J. agric. Res.*, **1**, 6, pp. 866–873, 3 fig., 1958.

In the Motueka district stem rot of tobacco, a major cause of seedling loss at transplanting, is due to a fungal complex in which *Sclerotinia sclerotiorum* [**30**, p. 363] and *Botrytis cinerea* are predominant [cf. **29**, p. 586], isolations producing either fungus consistently, but never both from the same plant; the former is the more pathogenic. Ferbam and thiram, at 3 gal./100 sq. ft., gave satisfactory control in inoculated seed beds in 1957, though causing temporary phytotoxicity; 20% PCNB dust at 3 oz., though even more phytotoxic, causing cupping of the leaves, was promising. In the field in 1956 ferbam 2 lb., thiram 1 lb., and dichlone ½ lb./100 gal., applied with a transplanting 'gun', resulted in 84, 82, and 96% successful replants in badly infested soil, respectively, compared with 50% in the untreated; dichlone, however, sometimes proved phytotoxic. There was also some indication that Cu compounds, applied as a drench to seed beds to control *Pseudomonas angulata*, may increase stem rot.

Maine (E. C.) & Kelman (A.). **Possible mechanisms of resistance in solanaceous plants to Pseudomonas solanacearum.**—Abs. in *J. Elisha Mitchell sci. Soc.*, **74**, 2, p. 85, 1958.

Growth of *P. solanacearum* in resistant tobacco plants [**38**, p. 56] was invariably inhibited by certain substances, the production of which in the leaves was light-dependent; agar diffusion technique failed to demonstrate their presence. The inhibitory components were either inactivated or removed by sap sterilization; following infection an increase in conc. of scolopetin and of an unidentified phenolic substance occurred, reaching a max. in susceptible plants, while there was a greater conc. of chlorogenic acid [**36**, p. 48] in the resistant plants. Reduced chlorogenic acid was only bacteristatic, but in oxidized form it was bactericidal to *P. solanacearum*; the authors suggest that the acid may play a part in the resistance mechanism.

Bhatt (J. G.) & Verna (S. S.). **Effect of growth regulating substances on virus affected Tomato plants.**—*Sci. & Cult.*, **23**, 11, pp. 610–611, 1 fig., 1958.

A large number of tomato plants of the American climbing var. grown in a field at the Institute of Plant Industry, Indore, India, exhibited symptoms of tomato streak (mixed virus) and the development of the terminal growing point was in

many cases arrested completely. Almost every plant died within a month. Disease symptoms appeared about 1 month after transplantation and became very severe within a fortnight. Plants sprayed with 25 ml. of a 20 p.p.m. solution of β-3-indolylpropionic acid or α-naphthalene acetic acid recovered within a fortnight, but plants treated with higher concs. died.

WHITESIDE (J. O.). **Experiments in controlling diseases of Tomatoes in Southern Rhodesia.**—*Rhod. agric. J.*, **55**, 5, pp. 533–545, 4 fig., 2 graphs, 1958.

Since Feb. 1956, when the 1st instance of foliar infection of tomatoes by *Phytophthora infestans* was recorded [**35**, p. 484; **38**, p. 296], the disease has spread in most parts of Mashonaland and the Eastern Border, but not to Matabeleland. The 1st serious outbreak occurred in Dec. 1956, since when severe damage has resulted in the higher rainfall areas; blight is now more serious than leaf spot (*Septoria lycopersici*) [**24**, p. 252].

Details of fungicide trials are presented, from which it is apparent that maneb (70%: 2 lb./100 gal.+4 oz. triton B-1956) at 100–300 gal./acre (according to the size of the plants) gave the best control of blight and was also effective for *S. lycopersici* (well controlled too by 4:2:50 Bordeaux, but with considerable phytotoxicity). A captan-zineb mixture (1+1 lb.: 100 gal.) was also effective. During wet weather 1 application/2 in. rainfall, or at least once a week, is necessary, making a total of 8–12 over the Dec.–Feb. crop.

GÜNTHER (ELIZABETH) & GRÜMMER (G.). **Untersuchungen über die Fruchtfäulen der Tomate.** [Investigations on fruit rot of Tomato.]—*Gartenbauwiss.*, **23**, (**5**), 1, pp. 130–159, 8 fig., 7 graphs, 1958.

Fruit rots of tomatoes studied at the Institut für Agrobiologie, Greifswald University, Germany, during 1952–57 are classified as black rots (*Alternaria porri* f. sp. *solani* [*A. solani*], *A. tenuis*, *Stemphylium botryosum* [*Pleospora herbarum*], and *Didymella lycopersici*), brown rots (*Phytophthora infestans* and *P. parasitica*), and soft rots (*Fusarium* spp., *Botrytis cinerea*, and *Phoma destructiva*), symptoms being described in detail. *Phytophthora infestans* was the most important, *A. solani* occurred extensively over the whole period, and infection by *D. lycopersici*, *Phoma destructiva*, and *B. cinerea* was fairly heavy in some years. König Humbert, Premier Selection, Dänische Export, Immuna Beta Prior, Niedrige Busch, and Première Révolte developed little late blight and Atom showed outstanding resistance in field tests over 3 yr.

SMITH (W. P. C.) & GOSS (OLGA M.). **Bacterial canker of Tomatoes.**—*J. Agric. W. Aust.*, **7**, 6, pp. 625–632, 8 fig., 1958.

Since 1945 bacterial canker (*Corynebacterium michiganense*) on tomatoes [cf. **38**, p. 102] has become very widespread in W. Australia. An account is given of the disease and its control; steeping seed for 25 min. in hot water+formalin (1 fl. oz./2½ gal.) at 127° F., drying rapidly, and dusting with an organic mercurial is recommended.

KIDSON (ELSA B.). **'Cloud' or vascular browning in Tomatoes. IV. Polypheno oxidase activity in cloud-susceptible fruit.**—*N.Z.J. agric. Res.*, **1**, 6, pp. 896–902, 1958.

Further investigations on 'cloud' [cf. **33**, p. 645] showed that polyphenol oxidase is active in abnormally ripening, 'cloud'-affected, fruit wall tissue, but is inactive in normally ripening wall tissue, even in 'cloud'-affected fruit. Polyphenol oxidase activity was high in very young fruit, decreasing and finally disappearing with maturity. Browning was generally at a max. near the vascular bundles, less concentrated in the larger parenchyma cells, and occasionally fairly heavy in cells near

the inner surface of the fruit wall. Healthy fruit wall tissue had an inhibiting action on the polyphenol oxidase browning of disintegrated 'cloud' tissue. Treating slices of blotchy tissue with certain solvents, such as 80% acetone or 95% alcohol or to a lesser extent water, greatly accelerated the speed and extent of the catechol browning. Ascorbic acid proved effective against browning in suspensions of blotched tissue, more by its reducing power than by its effect on pH. Citrate-phosphate and phosphate buffers largely inhibited browning. It is indicated that there is abnormal polyphenol oxidase activity in the blotched area of 'cloud'-affected fruit which persists in 'cloud' tissue ripened to the orange-red stage.

Oganova (Mme É. A.). О бактериальном раке Ясеня. [On bacterial canker of Ash.]—Сооб. Инст. Леса [*Soobshch. Inst. Lesa*], *1957*, 8, pp. 81–89, 2 fig., 1957. [Received 1959.]

In the Tellermanovski forest, Voronezh, U.S.S.R., infection of 50–55-yr.-old ash trees by *Pseudomonas savastanoi* var. [f. sp.] *fraxini* occurred at 10–15 yr. There is a detailed description of the disease, little known in U.S.S.R. [map 134]. The bark beetle (*Leperisinus fraxini*) not only injures the trees, leaving them open to infection, and transmits the disease, but prevents the healing of the wounds. *Auricularia mesenterica* was isolated from rotting parts of the cankers, which range from 0·5–32 cm. in diam., covering, in heavily infected trees, more than ⅔ of the bark. The disease is most damaging to young trees, which are also more susceptible.

Eradication of all diseased trees, elimination of all causes of wounds, including grazing cattle, and disinfection of the surrounding soil against bark beetles are recommended. Cutting out infected parts and branches and applying antiseptics to the wounds, which have proved very effective against olive tree canker, caused by the same sp., have been applied to infected ash trees.

Rŷshkova (Mme A. G.). О химическом составе гнилой древесины Березы и Осины. [On the chemical composition of wood rot in Birch and Aspen.]—*Zh. prikl. Khim., Moscow–Leningrad*, **31**, 2, pp. 265–273, 1958.

Analyses at the Voronezh Forestry Technical Institute, U.S.S.R., showed that birch white rot (*Fomes fomentarius*) [**36**, p. 559] and aspen white rot (*F. igniarius* f. *tremulae*) [**36**, p. 671] increased slightly the cellulose content of the wood, while brown rot (*Polyporus betulinus*) [loc. cit.] in birch and brown rot (*F. pinicola*) in aspen decreased it. The proportions of combustible, ether soluble, and acid fractions, and the sugar and xylan contents are given.

Kobayashi (T.) & Itô (K.). **Notes on the genus Endothia in Japan. I. Species of Endothia collected in Japan.**—*Bull. For. Exp. Sta. Meguro* 92, pp. 81–98, 5 pl., 7 fig., 1956. [Japanese and English.]

Descriptions are given of 7 spp., *E. parasitica* on chestnut [map 66], and the rest on dead wood [cf. **31**, p. 406].

Rangone Gallucci (Maria M.) & Perotti (G.). **Nota preliminare su una alterazione di Pioppelle in vivaio.** [A preliminary note upon an affection of Poplar seedlings in the nursery.]—*Boll. Lab. sper. Fitopat., Torino*, N.S., **21**, 1, pp. 9–15, 2 pl. (15 fig.), 1958.

In the summer and autumn of 1957, 1–2-yr.-old poplar seedlings in a nursery near Vercelli, Italy, were affected by a dark, plumbaceous or violaceous-red discoloration of the bark, which cracked longitudinally, revealing darkened tissues beneath. The leaves on the affected branches twisted up and darkened, but did not fall, though the branches themselves dried up. The condition, which was seldom fatal, affected 10% of the seedlings.

Affected material yielded a species of *Fusarium*, which in culture on carrot agar formed microconidia averaging 5–12·5 × 2–7·5 μ, while the 2-septate macroconidia

averaged 20–37 × 5–7·5 μ and the 4-septate 30–45 × 5–7·5 μ. Inoculations with the *Fusarium* reproduced the condition, the fungus being re-isolated. The work is to be continued.

Gambogi (P.) & Verona (O.). **Presenza in Italia di Pestalotia populi-nigrae Sawada et K. Itô, causa di una malattia ('shoot blight') del Pioppo.** [The presence in Italy of *P. populi-nigrae*, the cause of a disease ('shoot blight') of Poplar.]—*Ann. Sper. agr.*, N.S., **12**, 4, *Suppl.*, pp. I–III, 1958. [English summary.]

The fungus previously identified in Italy on felled poplar and named *Pestalotia lignorum* [**37**, p. 380] is now considered from a study of the respective diagnoses to be identical with *P. populi-nigrae* from Japan [**30**, p. 549].

Shearer (R. C.) & Mielke (J. L.). **An annotated list of the diseases of Western Larch.**—*Res. Note Intmtn For. Exp. Sta.* 53, 6 pp., 1958. [27 ref.]

Owing to the increasing economic importance of western larch (*Larix occidentalis*) in the W. United States, 26 spp. of fungi recorded in N. American literature as causing seedling and foliage diseases, cankers, root rots, and decay are listed.

Guilkey (P. C.), Rudolph (V. J.), & Sheppard (G.). **Effects of Sweetfern rust on the growth of young Jack Pine in northern Lower Michigan.**—*J. For.*, **56**, 12, pp. 900–903, 2 fig., 1958.

A survey of a 15-yr.-old plantation of jack pine (*Pinus banksiana*) indicated that *Cronartium comptoniae* [**11**, p. 615; **37**, p. 686] caused no significant difference in growth of the infected trees and no mortality, nor did it influence their general appearance. Most of the infection appeared to have originated in the nursery and was near the base of the tree. The effect of the fungus on radial growth was limited to the immediate area of the canker, though the exposed dead wood of this might serve as an entry point for wood rotting fungi.

Aoshima (K.) & Hayashi (Y.). **Some information on Ophiostoma coeruleum (Münch) H. & P. Sydow, causing blue stain in Japanese Red Pine (Pinus densiflora).**—*Bull. For. Exp. Sta. Meguro* 92, pp. 41–50, 2 pl., 2 fig., 1956. [Japanese. Abs. from English summary.]

The authors describe *O. coeruleum* [*Ceratocystis coerulea*: cf. **33**, p. 393], isolated from dead standing pine trees or sawn timber. In inoculation experiments wood blocks of *P. densiflora* and *P. thunbergii* became covered with abundant bluish-grey mycelium; on *P. banksiana* it was somewhat sparse. Hyphae were abundant in the pith rays and also occurred in the tracheids, which were penetrated through the bordered pits.

Schutt (P.). **Züchtung mit Kiefern. Teil I. Individualunterschiede und Provenienzversuche.** [Pine breeding. Part I. Individual variations and provenance trials.]—*Mitt. BdAnstalt Forst- u. Holzw.* 40, 65 pp., 1 fig., 5 graphs, 10 maps, 1958. [Numerous ref.]

On pp. 40–41 of this very condensed review of published work on the subject is a section on the differing resistance to *Lophodermium* [*pinastri*] in pines growing in countries other than their country of origin [**33**, p. 49; **35**, p. 731], which suggests that there may be biotypes of the fungus, differing in virulence.

Braun (H. J.). **Untersuchungen über den Wurzelschwamm Fomes annosus (Fr.) Cooke.** [Studies on the root fungus *F. annosus*.]—*Forstwiss. Zbl.*, **77**, 3–4, pp. 65–88, 6 fig., 1958. [71 ref.]

At the Institut für forstliche Mykologie und Holzschutz, Hann-Münden, Germany, *F. annosus* [**35**, p. 800; **36**, p. 794] grew well and developed fruit bodies in sterilized soil, but did not grow in either laboratory or field in non-sterile soil. The fungus

is primarily a parasite on living trees, and secondarily a saprophyte on the roots of dead trees which were attacked when still alive. Spread occurs by means of spores and by mycelial growth in root-to-root contacts, particularly in soils in which nutrient deficiency and/or alkalinity [cf. **30**, p. 440] limits the development of saprophytic antagonists. In a humus soil infection appears to penetrate downwards to the roots growing deep in the mineral strata and to spread horizontally only in roots below the humus layer. Penetration of the roots occurs through lenticels and wounds, the fungus being unable to pass through the layers of tannin cork cells in the intact bark.

Low (J. D.). **Fomes annosus.**—*Unasylva*, **12**, 4, pp. 180–182, 1 fig., 1958.

A short review from the Forestry Commission, U.K., of recent research on the control of *F. annosus* [**37**, p. 119], to be published elsewhere in greater detail.

Linzon (S. N.). **The influence of smelter fumes on the growth of White Pine in the Sudbury region.**—45 pp., 7 fig., 17 graphs, 1 map, Toronto, Ontario Departments of Lands and Forests and of Mines, 1958. [25 ref.]

A survey of white pine (*Pinus strobus*) forests over the years 1949–1954 in the Sudbury smelting district of Ontario, involving the examination of about 7,000 trees (50–90 yr. age group) annually, indicated that within 25 miles of the smelters foliage suffered extensive SO_2 injury [cf. **37**, p. 21] accompanied by a gradual decline in the annual diam. increment. The volume of white pine lost through excessive tree mortality exceeded that produced by the surviving trees. 'Rough bark', a scaly, canker-like growth extending up to 40 ft. from the base of the tree, and 'purple bark', a colour abnormality, were more frequent in the areas near the smelters, but fewer trees displayed symptoms of heart rot, blister rust (*Cronartium ribicola*), and stem deformities caused by weevils (*Pissodes strobi*).

Gersonde (M.). **Untersuchungen über die Giftempfindlichkeit verschiedener Stämme von Pilzarten der Gattungen Coniophora, Poria, Merulius und Lentinus. III. Merulius lacrymans (Wulf.) Fr. und Merulius silvester Falck.** [Studies on the sensitivity to toxicity of various strains of fungus spp. of the genera *Coniophora*, *Poria*, *Merulius*, and *Lentinus*. III. *M. lacrymans* and *M. silvester*.]—*Holzforschung*, **12**, 6, pp. 167–175, 1 fig., 1 graph, 1958. [English summary. 42 ref.]

Further studies in the current series [**38**, pp. 41, 232] revealed marked differences between 4 strains of *M. lacrymans* in their capacity for the destruction of pine sapwood blocks, the highest weight reductions (42%) over a test period of 16 wks. being caused by the standard strain III (Eberswalde 315, 1936) and the lowest (20%) by BAM 133 (isolated in 1937 from the wood of a Berlin house) and 277 (Berlin wood, 1941), while BAM 238 (floor of a Berlin house, 1939) was intermediate (33%). On the other hand, the action of 2 strains of *M. silvester* [**7**, p. 292], BAM 195 (isolated in 1938 from a beam of a Berlin laundry) and BAM 288 (1942, sample of wood colonized by termites at Naples, Italy), was quite uniform. The low weight reductions at 20° C. were nearly 3 times greater at 26° [cf. **33**, p. 126]. There is considered to be no doubt, from the constancy of its morphological characters, that *M. silvester* is a good sp.

In general, the malt agar cultures of the 6 strains were most sensitive to the fluorine compounds (magnesium silicofluoride and sodium fluoride) and $HgCl_2$, somewhat less so to disodium arsenate and pentachlorophenol, and most resistant to coal tar oil. *M. silvester* cultures were always among the most resistant. Having regard to the most resistant culture in each series, the limiting values for the standard strain of *M. lacrymans* should be doubled for coal tar oil and sodium arsenate and trebled for pentachlorophenol.

Gersonde (M.) & Becker (G.). **Prüfung von Holzschutzmitteln für den Hochbau auf Wirksamkeit gegen Pilze an praxisgemäßen Holzproben ('Schwammkeller'-Versuche).** [Testing of wood preservatives against fungi in buildings under semipractical conditions ('fungus-cellar' tests).]—*Holz a. Roh- u. Werkst.*, **16**, 9, pp. 346–357, 7 fig., 1958. [English summary.]

In tests at the Bundesanstalt für Materialprüfung, Berlin-Dahlem [cf. **38**, p. 41], pieces of commercial pine and spruce boards, 50 cm. long, were laid, treated and untreated alternately, on untreated underfloor timbers to form a pattern floor 85×50 cm.; a soil foundation provided a moist underfloor space, the surface being covered by glass plates to give an air-tight floor covering. The tests were made in a large 'fungus-cellar' with constant conditions, the boards being inoculated by inserting portions of pure cultures between the boards and the under floor. The intensive fungus attack ensured a reasonable certainty of results. Thresholds of fungicidal effectiveness were determined as follows: magnesium silicofluoride [see above] (chosen for sample testing), with double brushing and 4–8 weeks' storage, 13–15 g./sq.m. wood surface for *Merulius lacrymans* [**38**, p. 106] and 18–20 g./sq.m. for *Coniophora cerebella* [*C. puteana*]; in the standard DIN 52176 test, using pine blocks given 1 brushing treatment in Kolle flasks they were 2–3 g./sq.m. and 3–6 g./sq.m. after 4 weeks. The differences between the 2 sets are mainly caused by differences in preservative distribution due to wood properties and methods of application. In the fungus-cellar tests the thresholds for *M. lacrymans* and *C. puteana* were closer than in the flask test. Under the special conditions of the pattern floor *M. lacrymans* reacts differently from in the flasks, proving more resistant in the 'fungus-cellar'. As a result of these tests it was ascertained that ½ the amount of preservative and ½ the number of coats prescribed in the German standard DIN 68800 is sufficient to prevent decay. The author suggests that all types of preservatives used for timber in building construction should undergo such a 'fungus-cellar' test in addition to the standard test.

Russell (P.). **A biological method for assessing the storage quality of moist groundwood pulp.**—*Svensk Papptidn.*, **61**, 16, pp. 493–500, 3 fig., 1 graph, 1958. [Swedish and German summaries.]

Fundamentally, the method depends upon the diffusion of a preservative from small disks, punched out of sample pulp-sheets, into nutrient agar uniformly seeded with an indicator organism, such as *B[acillus] subtilis*. The disks are placed upon a layer of solid plain agar and then covered with the seeded nutrient agar and incubated overnight. The diam. of the inhibition zones is proportional to log. conc. of active preservative present and the results, calculated in a manner described, are expressed as 'p.p.m. of biologically active fungicide in the bone-dry pulp'. The technique facilitates the forecasting of the storage life of groundwood pulp treated with phenyl mercuric acetate alone or +8-hydroxyquinoline (oxine), normally at a conc. of 60–90 g./air-dry ton.

Spurious inhibition zones have been observed occasionally, due to the presence of *Trichoderma koningi*, secreting gliotoxin; *T. viride* behaves similarly.

Reed (L. B.) & Doolittle (S. P.). **Insects and diseases of vegetables in the home garden.**—*Home Gdn Bull.* 46, 48 pp., 4 col. pl. (14 fig.), 49 fig., 1958.

A revised edition [**36**, p. 152].

Yukawa (Y.). **On the free amino acids and the catalase activity in the club-root tissue of Crucifers.**—*Bull. Fac. Agric. Yamaguti Univ.* 9, pp. 963–968, 1 fig., 1958. [Japanese. Abs. from English summary.]

Chromatographic analyses of healthy root tissue of the Chinese cabbage and that infected by club-root (*Plasmodiophora brassicae*) [**38**, p. 110] demonstrated aspartic

acid, glutamic acid, cystine, alanine, and asparagine, the last 3 being more abundant in the infected, which had glycine, arginine, and leucine in addition, though glutamic acid was less abundant and aspartic acid varied with the degree of abnormal growth. Catalase activity, measured by Warburg's manometric method, was 7 times greater in the infected tissues; it is correlated with respiratory activity and seems to play a significant role in the mechanism of hypertrophy.

Bode (O.) & Brandes (J.). **Elektronenmikroskopische Untersuchung des Kohlrübenmosaik-Virus (Turnip mosaic virus).** [Electron microscopic study of Turnip mosaic virus.]—*Phytopath. Z.*, **34**, 1, pp. 103–106, 1 fig., 1 graph, 1958. [English summary.]

These studies at the Institut für Landwirtschaftliche Virusforschung, Brunswick, on the virus strains TUM from turnip, considered to be of the turnip mosaic virus type, TUS with similar characteristics but inducing symptoms of the turnip crinkle virus type [see below], a black ring spot strain isolated and described by Ullrich [**35**, p. 338], a strain of cabbage black ring virus from rape from the American Type Collection, another strain of turnip mosaic virus isolated from *Alliaria officinalis* in 1955, and a crucifer virus considered by Uschdraweit and Valentin [**37**, p. 357] to be a strain of turnip mosaic virus showed that all had similar thread-like virus particles normally 754 mμ in length and 12–13 mμ in diam. All are considered to belong to the turnip (turnip mosaic) virus 1 group. In this group also is the virus which in German literature has been given the name turnip crinkle mosaic. Cabbage black ring spot virus is given as a synonym.

Broadbent (L.) & Heathcote (G. D.). **Properties and host range of Turnip crinkle, rosette, and yellow mosaic viruses.**—*Ann. appl. Biol.*, **46**, 4, pp. 585–592, 2 pl. (6 fig.), 1958.

Studies at Rothamsted Experimental Station on 3 isolates of turnip yellow mosaic virus [cf. **36**, p. 507; **38**, p. 234] (Edinburgh strain, from turnips growing near Dundee; Northumberland strain, from cruciferous crops in north-eastern England; and a Bristol strain from diseased *Lunaria annua* plants near Bristol); one of turnip rosette virus [cf. **36**, p. 813; loc. cit.] from Kincardineshire; and one of turnip crinkle virus [cf. **36**, p. 506; **37**, p. 698 and above] from the same area, all transmitted by flea-beetles (*Phyllotreta* and *Psylliodes* spp.), showed that whereas the Bristol strain is closely related to the Edinburgh one, the Northumberland isolate was serologically distinct, though a strain of the virus. Turnip crinkle and rosette viruses are not serologically related to each other or to turnip yellow mosaic virus. It was ascertained that all have a thermal inactivation end-point between 80 and 90° C., a dilution end-point $> 10^{-4}$, and a longevity *in vitro* of at least 30 days at about 20°. All were transmitted by mechanical inoculation to a wide range of cruciferous host plants, including turnip and pe-tsai (*Brassica pekinensis*) and many weeds. Evidence was obtained indicating that the viruses may spread by contact between plants in the field as well as by insect transmission.

Most pe-tsai and turnip plants infected by the Edinburgh or Northumberland isolate of turnip yellow mosaic could still become infected by the Bristol isolate, as detected serologically, though the symptoms did not change. When plants were inoculated with turnip crinkle virus and any one of the yellow mosaic isolates, either simultaneously or after symptoms of one disease had appeared, the plants became more stunted. Young turnip seedlings usually died when inoculated with both crinkle and rosette viruses.

The chief difference between the yellow mosaic virus isolates and the other viruses was that rosette virus infected a few and crinkle many non-cruciferous plants, whereas the only non-cruciferous plant infected by yellow mosaic virus was *Reseda odorata*.

Tomlinson (J. A.). **Crook root of Watercress. I. Field assessment of the disease and the role of calcium bicarbonate. II. The control of the disease with zinc-fritted glass and the mechanism of its action. III. The causal sorganism, Spongospora subterranea (Wallr.) Lagerh. f. sp. nasturtii f. sp. nov.**—*Ann. appl. Biol.*, **46**, 4, pp. 593–607, 3 graphs, 1 diag.; 608–621, 4 graphs, 1958; *Trans. Brit. mycol. Soc.*, **41**, 4, pp. 491–498, 1 pl., 4 fig., 1958.

A full account is given of studies at the National Vegetable Research Station, Warwick, noticed in brief elsewhere [cf. **37**, p. 511 *et passim*]. Evidence was obtained that the disease increased with increasing distance from the water source, was most severe from Oct. to Apr., and affected brown watercress (*Nasturtium officinale*×*N. microphyllum*) more than green (*N. officinale*). The healthy condition of plants near fresh-water inlets was found to be associated with a low conc. of zoospores at these points. The combined Ca+Mg bicarbonate content in 87 spring and artesian waters supplying affected watercress beds varied, with 1 exception, from 282–401 p.p.m.; the only bed fed by water with a higher total bicarbonate content (525 p.p.m.) was unaffected. Artificial increase of the Ca bicarbonate content of the intake water controlled the disease, but was uneconomic [**37**, p. 1]. Solutions containing 350–750 p.p.m. Ca $(HCO_3)_2$ had no effect on the germination of zoosporangia or on zoospore activity, and the controlling effect of calcium carbonate, though comparable to that on *Plasmodiophora brassicae*, is obscure and needs further study; crook rot infection was unaffected by pH variations from 6–7·5.

When zinc frit was shaken with distilled water for 24 hr., a solution containing 0·21 p.p.m. was obtained, but this rose to 2·82 p.p.m. if watercress had previously been grown in the water, because the latter contained 16 p.p.m. CO_2 which exerted a solvent action on the frit. The Zn content of treated plants was much below the tolerance level of 50 p.p.m. recommended by the Foods Standards Committee, and the treated water proved harmless to fish.

A description is given of the morphology of the fungus responsible for the disease. Failure of the fungus to infect plants growing as weeds in watercress beds, or tomato, distinguishes it from *S. subterranea* from potato, which it otherwise resembles, but which failed to infect watercress, and the name *S. subterranea* f. sp. *nasturtii* is proposed.

Steudel (W.). **Die Rolle der Mietenlaus (Hyperomyzus tulipaellus Theob.) im Seuchenzyklus der Vergilbungskrankheit der Beta-Rüben (Beta-Virus 4, Corium betae Holmes).** [The role of the clamp aphid (*H. tulipaellus*) in the epidemic cycle of the yellows disease of *Beta* Beets.]—*Anz. Schädlingsk.*, **31**, 5, pp. 67–71, 1 graph, 1958.

Comparative field-infection tests over 2 yr. at the Institut für Hackfruchtbau, Aussenstelle Elsdorf/Rhld., Germany, indicated that *H. tulipaellus* [*Rhopalosiphoninus staphyleae*] can play a significant role as a vector of beet yellows virus [**38**, p. 235], but not of beet mosaic virus. Under central European conditions considerable numbers of winged *R. staphyleae* occur on stored beet in Apr. and May, and can thus transmit yellows to field beet, setting up foci of infection from which the virus can later be spread rapidly by *Myzus persicae* and *Doralis* [*Aphis*] *fabae* [cf. **37**, p. 690].

Mischke (W.). **Mikroklimatische Untersuchungen als Voraussetzung für die Einrichtung eines Cercospora-Warndienstes im niederbayerischen Zuckerrübenanbaugebiet.** [Microclimatic studies as a prerequisite condition for the organization of a *Cercospora* warning service in the Lower Bavarian area of Sugar Beet cultivation.] –*Zucker*, **12**, 2, pp. 25–29, 3 fig., 1958.

The results of preliminary studies at the Bayerische Landesanstalt für Pflanzenbau

and the Landwirtschaftliche Hochschule Hohenheim revealed close correlations between local climatic conditions and those of the micro-climate prevailing within the beet crop [cf. **32**, p. 263]. Factors promoting the development of *C. beticola* [**38**, p. 47] were periods of 3–4 days during which the R.H. exceeded 95% for at least 8 hr. or wetting of the leaves for a minimum of 10 hr. daily over a similar period.

The influence of temp. was investigated by a calculation of the daily mean temp. (Tm) summation values. With decreasing Tm the incubation period was prolonged and vice versa [cf. **35**, p. 338]: thus, for the 2 Tm extremes of 22 and 15° C. the incubation periods were 11 and 22 days respectively. A mathematical method of ascertaining the thermal zero point of the pathogen is briefly outlined.

Hoyos (Graf). **Cercosporainfizierte Runkelrüben, eine Gefahrenquelle fur den Zuckerrübenanbau.** [*Cercospora*-infected Beetroots, a source of danger for Sugar Beet production.]—*Pflanzenschutz*, **10**, 9, p. 102, 1958.

At a conference at Plattling, 5 Sept. 1958, organized by the Bayerische Staatsministerium für Ernährung, Landwirtschaft, und Forsten, it was concluded that infection by *C.* [*beticola*] should be combated by the use of treated seed [**38**, p. 46] of both sugar beet and beetroot, preferably produced in areas free from the disease.

Assaul (B. L.) & Ovcharenko (A. Y.). Агротехнические и химические меры борьбы с ржавчиной Сахарной Свеклы. [Agrotechnical and chemical measures for the control of rust in Sugar Beet.]—Сах. Свек. [*Sug. Beet, Moscow*], *1958*, 9, pp. 44–47, 2 fig., 1958.

When the roots of sugar beet seedlings were treated in the spring, at the Uladovo-Lyulinetskii Experimental Selection Station, U.S.S.R., with dry granosan or mercuran, both plus lime at 1:10, the incidence of rust [*Uromyces betae*: **37**, p. 195] was reduced from 70·5% in the untreated to 5·6%. At 1:5 the mixture gave 100% control.

Wet treatment, soaking the roots for 5–10 min. in 0·25% granosan and then leaving for 2 hr., also gave complete control but proved more difficult and costly.

Two sprays of 0·5% phygon gave only 0·09% infected plants; fuclasin and zineb were less effective. Late planting-out of seedlings is recommended in districts where rust infection is high, deep ploughing and soil disinfection also being necessary.

Singaevskaya (Mme V. N.). Влияние пинцировки высадок на устойчивость всходов Свеклы к корнееду. [The effect of pinching the tops of Beet seedlings on the resistance to black leg.]—Сах. Свек. [*Sug. Beet, Moscow*], *1958*, 6, pp. 42–43, 1958.

At the Batyevogorod Sugar Beet Research Institute and the Salivonkovski Beet State Farm, sugar beet tops were pinched at 3–5 cm. The seed pods were much heavier, the seeds had a higher germination capacity, and plants from such seeds were markedly resistant to black leg [*Phoma betae*: **37**, p. 195]. In humid soil removing half the flower shoots gave good control of the disease, but is unnecessary in dry districts.

Schroeder (W. T.) & Barton (D. W.). **The nature and inheritance of resistance to the Pea enation mosaic virus in Garden Pea, Pisum sativum L.**—*Phytopathology*, **48**, 11, pp. 628–632, 2 fig., 1958.

In these studies at New York State Agricultural Experiment Station, Geneva [cf. **37**, pp. 615, 672], the resistant selection G 168 of the pea var. P.I. 140295, used as a parent in crosses with susceptible domestic vars., was inoculated with 3 strains of the virus by means of *Macrosiphum* [*Acyrthosiphon*]*pisi*. A few plants developed

atypical systemic symptoms, a faint mottle and chlorotic flecking, not seen in the field. Virus recovered from some of these plants produced typical symptoms in susceptible vars., though sometimes with less virulence. A few resistant plants developed typical enation symptoms at bloom or later, apparently due to an aberrant strain arising in the greenhouse. The maintenance of such a strain on susceptible vars. for several transfers resulted in loss of virulence for the resistant lines.

It was shown that resistance is conditioned by a single dominant gene, En, not closely linked with Le, the gene for tallness, or R (round seed).

CARTER (M. V.). **Chemical destruction of mature perithecia of Mycosphaerella pinodes.**—*Nature, Lond.*, **183**, 4655, pp. 162–163, 1 fig., 1959.

In S. Australia large areas of garden peas grown under sprinkler irrigation in areas with 12 in. or less annual rainfall suffer extensive damage by *M. pinodes* [**36**, p. 454]. At the Waite Agricultural Research Institute, Adelaide, phenyl mercuric chloride failed to destroy mature perithecia when applied at 0·1%, the conc. used in the autumn to eradicate *Venturia inaequalis* on apple leaves [**37**, p. 134].

In a series of laboratory tests in Feb. 1958 hand-atomized oil-and-water emulsion containing 0·75% of pentachlorophenol was applied to a series of 5–10 g. samples of heavily infected pea straw from the 1957 crop. Ascospore discharge was tested with a Hirst-type spore impactor; spore counts suggested that this conc. exerted a powerful fungicidal effect on the mature perithecia, but that complete coverage had not been obtained. In a second series to determine the effect of a range of concs. of pentachlorophenol on 10 g. samples momentarily immersed in the emulsion, spore counts indicated a very efficient kill with all concs. down to 0·2%. After the 5th discharge all the samples were showered with ascospores of *M. pinodes* and incubated while moist in closed containers at room temp. A very heavy mycelial growth was present on the steam-sterilized control straws after 5 days' incubation; a few isolated colonies were observed on all the samples treated with pentachlorophenol except for the 2% conc. Histological examination demonstrated that the chemical had completely destroyed the contents of the perithecia. However, there is likely to be considerable difficulty in obtaining adequate spray coverage in the field.

Preliminary tests showed that 0·2% DNOC and dinitro-secondary butyl-phenol are likely to give similar results.

HERZMANN (H.). **Biochemische Untersuchungen über den Stoffwechsel gesunder und brennfleckenkranker Bohnen. II. Untersuchungen über sekundäre Pflanzstoffe.** [Biochemical studies on the metabolism of healthy and anthracnose-diseased Beans. II. Studies on secondary plant substances.]—*Phytopath. Z.*, **34**, 2, pp. 109–136, 5 fig., 7 graphs, 1958. [English summary.]

Further studies [cf. **38**, p. 173] at the Institut für Phytopathologie, Aschersleben, Germany, disclosed that [*Phaseolus vulgaris*] leaves infected by *Colletotrichum lindemuthianum* contained more quercetin glycoside than healthy ones, and also *p*-coumaric methyl ester and a condensed substance, probably a precursor of melanin, whereas healthy leaves did not. Diseased fruits, similarly, contained chlorogenic acid, *p*-coumaric-quininic ester, caffeic acid, *p*-coumaric acid, *p*-coumaric methyl ester, the condensed substance, and less quercetin glycoside. In diseased stems less lignin was found than in healthy. The enzymes associated with the synthesis of some of these substances were investigated and are discussed.

JOHNSON (H. W.). **Registration of Soybean varieties, VI.**—*Agron. J.*, **50**, 11, pp. 690–691, 1958.

Jackson (Reg. No. 22), which originated in a co-operative programme of the N. Carolina Agricultural Experiment Station and the U.S. Regional Soybean Labora-

tory, is superior to Roanoke [**31**, p. 163] in yield and resistance to [unspecified] lodging, equal to it in oil and protein content, and is resistant to target spot [*Corynespora cassiicola*: **37**, p. 199] and frog-eye [*Cercospora sojina*: **33**, pp. 402, 699]. Lee (No. 23) [**33**, p. 699], also resistant to target spot, is superior to Ogden in yield, protein content, seed quality, and resistance to shattering and diseases. It is the most widely grown variety in its area of adaptation and is grown over almost the whole of the soybean acreage of the High Plains of Texas.

Johnson (H. W.), Means (U. M.), & Clark (F. E.). **Responses of seedlings to extracts of Soybean nodules bearing selected strains of Rhizobium japonicum.** —*Nature, Lond.*, **183**, 4657, pp. 308–309, 1 fig., 1959.

Previous experimental work [**38**, p. 113] did not make it possible to distinguish between the response of the soybean genotype to treatment, that of the bacterial genotype, or the effects of both. Further studies aimed at developing a technique for evaluating the production of the chlorosis-inducing substance independently of symptoms on the tops of nodule-bearing plants, and testing its effects on other plant species. Source material consisted of nodules from chlorotic soybean plants inoculated with chlorosis-inducing *R. japonicum* strain 76, referred to as C, and from normal plants inoculated with strain 31, referred to as N.

Both N and C extracts more conc. than 1/50 were toxic to all soybean seedlings but little chlorosis developed. Toxicity appeared to result primarily from damage to the root system; development of branch roots was inhibited and the main root quickly became greyish-brown and water-soaked. Seedlings of the highly susceptible Lee var. and of the slightly susceptible CNS var. were equally chlorotic in the 1/50 C extract. In contrast, chlorosis of Lee in 1/100 was as severe as in the 1/50, but CNS was free of chlorosis.

Severe chlorosis appeared in onion, *Digitaria sanguinalis*, sesame, sorghum, Sorgo (sorghum var.), red clover, and *Trifolium subterraneum*; in sorghum the onset of chlorosis was 2 days after initial exposure, in the other 6 after 3 days. The av. number of days for onset in 13 spp., listed as moderately chlorotic, was 8·2, and for slightly chlorotic, 10·3. Seedlings of *Phaseolus vulgaris* and *P. lunatus* became mottled after 3 weeks in the extract.

Damage to roots and general retardation of growth, as described for soybeans, occurred to varying degrees with other species. Safflower and cotton were particularly susceptible, though neither developed chlorosis. Growth of soybeans in fresh C extract filtered through a bacteriological-grade sintered glass filter was more rapid and chlorosis more severe than that of seedlings in unfiltered extract. However, this was not true for autoclaved extracts. The several experiments indicated that the water-soluble substance causing chlorosis is an entity differing from that causing toxicity.

Agnihothrudu (V.). **Fungi isolated from rhizosphere—IV.**—*J. Indian bot. Soc.*, **37**, 3, pp. 422–431, 44 fig., 1958.

The author lists and describes 16 spp. of ascomycetes isolated at the University Botany Laboratory, Madras, India, from the rhizosphere of pigeon pea [cf. **37**, p. 569].

Chambers (S. C.). **Cover spraying for the control of Celery leaf spot.**—*J. Agric. W. Aust.*, **7**, 6, pp. 632–634, 1 fig., 1958.

Of 8 fungicides tested at Balcatta, 4:4:40 Bordeaux proved the most successful against leaf spot (*Septoria apii*) [**34**, p. 434] on celery crops transplanted in Mar. 1958, though it discoloured the foliage. Phygon at 1 lb./100 gal. was also fairly successful in controlling the disease but the growth of plants was retarded and they were paler than normal.

BADAMI (R. S.). **Changes in the transmissibility by aphids of a strain of Cucumber mosaic virus.**—*Ann. appl. Biol.*, **46**, 4, pp. 554–562, 1958. [21 ref.]

A strain of cucumber mosaic virus isolated from naturally infected spinach in 1946 [**31**, p. 220] was readily transmitted by *Myzus persicae* until 1955, when it lost this property, though propagated at Rothamsted Experimental Station in conditions in which other strains remained transmissible. Further tests showed that *M. circumflexus* transmitted Price's yellow strain of the virus and a green strain, but not this one, which was, however, readily transmitted by *Aphis gossypii* and slightly less so by *M. ascalonicus*. Transmission by other aphid spp., propagation in different plant spp., and several passages through spinach did not increase transmissibility by *M. persicae*, nor were cultures from occasional successful transmissions any more readily transmissible by this sp.; such cultures in a few weeks also ceased altogether to be transmissible by the aphid. Possible explanations of the change are discussed.

EDDY (B. P.). **Production of Mushroom mycelium by submerged cultivation.**—*J. Sci. Fd Agric.*, **9**, 10, pp. 644–649, 1958.

At the Low Temperature Research Station, Cambridge, 9 edible fungi, grown in stirred aerated culture (cf. Lambert, *Bot. Rev.*, **4**, p. 397, 1938) on various media, gave satisfactory harvests of mycelium, but flavours, where present, were weak, and could not be improved by treatment of the mycelium after harvesting.

Annual Report 1957, Glasshouse Crops Research Institute.—161 pp., 2 pl., 15 fig., 9 graphs, 2 plans, [? 1958. Received Jan. 1959.]

In the Plant Pathology section (pp. 120–133) [cf. **37**, p. 633] P. H. WILLIAMS reports that 2:4:6-trichlorophenoxyacetic acid watered on tomato plants inoculated with *Didymella lycopersici* did not increase susceptibility; the results, which are contrary to those previously reported [**36**, p. 558], require further confirmation. A small scale experiment suggested that *D. lycopersici* does not readily invade the roots from inoculated stems [**33**, p. 266]. Further studies of antagonism to the fungus in the soil are in progress.

In further work on resistance to cucumber mildew [*Erysiphe ? cichoracearum*] within the family Cucurbitaceae OLWEN M. STONE found that immune spp. are unlikely to cross readily with cucumber. In the search for other hosts mildew from *Ranunculus repens* (*E. nitida*) inoculated to cucumber gave up to 50% infection early in the year, but as the season advanced this fell to less than 5%. The experiments are being continued.

In further investigations into carnation wilts MARION H. EBBEN observed that the main shoots of *Melandrium album* seedlings, soil-inoculated with *Fusarium roseum*, died back with pinkish-brown discoloration of the pith; the fungus was re-isolated from this tissue. *Verticillium cinerescens* also was re-isolated from brown tissue in the roots of one *M. album* plant, though not from discoloured xylem in the stem. Apparently this weed can act as a carrier of these 2 fungi and may enable them to survive in field soil.

An isolate of *Erwinia* [**36**, p. 31] from a wilting carnation was prick inoculated into young carnation and 2 young chrysanthemum plants. No external symptoms developed on the chrysanthemums in 3 months but there was a slight browning of the xylem just above the point of inoculation. Typical *E.* colonies were isolated from both sets.

DOREEN G. GANDY reports further study of La France disease as a result of epidemic outbreaks of similar disorders, variously termed brown disease [**37**, p. 628] and watery stipe [**37**, p. 695], on commercial farms during the autumn of 1957. The symptoms observed did not correspond to those of La France disease, mummy disease [**36**, p. 231], or damping-off [**16**, p. 434], but almost every symptom was

common to more than 1 disease already described. The spawn used in the only cropping experiment in the mushroom house in 1957 was obtained from abnormal crops on commercial farms. The most significant aspect of the results was the very low yields of several of the spawns; there is evidence that the type of disorder concerned is greatly influenced, if not caused, by environmental conditions. When affected mushroom trays and sections of beds were transferred to an atmospheric humidity and temp. lower than usual for mushroom houses, those which continued to crop either gave normal and healthy mushrooms at once or did so in the flush following the transference. Microscopic examination of fixed and sectioned portions of stipe tissue with the 'watery streak' symptom showed the tissues in the water-logged streaks to have become disorganized, the walls having broken down. In these areas the damaged hyphae and inter-hyphal spaces were colonized by bacteria. Dark brown spots and blotches with a fine grey-white mycelium growing on them appeared on the pilei. This fungus appeared to be identical with the *Acremonium* sp. described by Bulloch [**29**, p. 194] which, from the evidence now available, appears to be the same as *Cephalosporium lammellicola* [**4**, p. 167].

In the Crop Protection section (pp. 148–158) W. H. Read gives the results of a fungicide trial against chrysanthemum mildew (*Oidium chrysanthemi*) [**36**, p. 480]. Preliminary tests showed that karathane (0·006% active ingredient) was superior to 0·08% salicylanilide. Four applications of these and thiram, alone or combined with 0·3% petroleum summer wash emulsion, were given, the 1st on 9 Oct. when signs of mildew were detected on several plants, and the others at intervals of 2 or 3 weeks. The best control, estimated on 10 Dec., was obtained with karathane and salicylanilide, both plus petroleum, ratings 0 and 1, respectively, compared with 5 (30% leaf area affected) for the control. The petroleum alone gave a rating of 3. However, the tests were made on 4 chrysanthemum vars. only (Rolinda, Loveliness, Balcombe, and White Progress) and should be repeated over a wider range.

Sibilia (C.). **Rassegna dei casi fitopatologici più notevoli osservati nel 1957.** [A review of the most noteworthy phytopathological records made in 1957.] —*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (*1957*), 2, pp. 335–350, 1958.

It is reported from Italy [cf. **37**, p. 202] that vines at Tivoli were attacked by excoriosis (*Phoma flaccida*) [cf. **36**, p. 635], uncommon in Italy; olive fruits from Catanzaro and Gioia Tauro were infected by *Sphaeropsis dalmatica* [cf. **33**, p. 307], once in association with *Gloeosporium olivarum* [**36**, p. 413], which appears to be spreading. Citron near Catanzaro developed a wilt caused by *Fusarium lateritium* [*Gibberella lateritia*: cf. **34**, p. 377]. Plane trees (*Platanus occidentalis*) in Ravenna were severely attacked by *Gnomonia veneta* [*G. platani*], which caused wilting. Wheat at Marciano was affected by foot rot (*Leptosphaeria herpotrichoides*), while the inflorescences bore conidial *Gibberella saubinetii* [*G. zeae*]. Peas at Salerno were severely infected by *Ascochyta pisi* [cf. **36**, p. 368]. Tomato fruits from Syracuse and Ragusa were affected by *Xanthomonas vesicatoria* [map 269], while the vegetative organs and occasionally the fruits were attacked by *Corynebacterium michiganense* [cf. **34**, p. 407].

Neergaard (P.). **10. Årsberetning vedrørende frøpatologisk kontrol 1. Juin 1957 — 31. Maj 1958.** [Tenth Annual Report concerning seed-pathological testing 1 June 1957–31 May 1958.]—15 pp., Statens Plantetilsyn, København, 1958. [English summary.]

Most of the records in this report [cf. **38**, p. 54] are concerned with well-known seed-borne pathogens on their usual hosts. New to Denmark, however, is *Alternaria cichorii* on 4 out of 5 samples of endive.

Научная конференция по защите растений. [Scientific Conference on plant protection.]—84 pp., Lithuanian Academy of Science, Vilnius, 1958.

At this conference, held in Vilnius, Lithuanian S.S.R., on 27–31 Mar. 1958, A. Minkyavichus & Z. Vinitskas (pp. 3–4) reported on research on plant diseases and pests in Lithuania, Mme T. I. Fedotova (pp. 5–6) on immunity from plant diseases, and K. Brundza (pp. 44–45) on the study of the flora of parasitic fungi and its problems in the country. Z. Vinitskas, M. Strukchinskas, & P. Zhemaĭtene (pp. 46–47) reported that *Puccinia coronifera* [*P. coronata*: **31**, p. 430] becomes epiphytotic on oats every 5–6 yr., causing 30–70% loss. As local vars. are susceptible the resistant Sovetskiĭ, a heavy yielder, is being introduced. When K and P fertilizers were used for 4 yr. on the moderately resistant Girunes incidence decreased considerably. This method of control is adopted generally in the country.

A. A. Prisyazhnyuk (pp. 48–49) dealt with diseases of the seed of trees and shrubs and their control. I. Y. Zherbele (pp. 50–51), discussing the systematics and biology of *Ascochyta*, mentioned a new sp., *A. lallemantiae* [no Latin diagnosis]. M. Michens (pp. 52–53) dealt with tomato diseases and their control in Lithuania; top rot is caused by increased sodium nitrite in the soil, low temp., and low air humidity. M. Strukchinskas (p. 54) reported that the prevalence of empty ears in winter wheat, associated with *Fusarium* sp., *Ophiobolus graminis*, *Helminthosporium sativum* [*Cochliobolus sativus*], and *Alternaria tenuis*, is highest in fields previously sown with spring wheat and barley; most resistant were the var. 613 and the hybrid 599. Y. Shkipsna (p. 56), on losses of red clover and grasses in W. Lithuania during the winter, stated that root rot [unspecified] of autumn sown clover was exceptionally severe in the 1st yr., with up to 37·5% loss, whereas in the 2nd yr. it was only 1·9%. *Typhula idahoensis* and *T. itoana* caused severe damage to ryegrass [*Lolium*].

I. Binilauskaĭte (p. 57) reported that black leg (*Bacterium phytophthorum*) [*Erwinia phytophthora*: **37**, p. 593] caused up to 9·1% loss when cut potato tubers were planted in Aug., whereas with early planting incidence was negligible. Treating the tubers with granosan and formalin gave good results. E. Petrauskaĭte (p. 58) spoke on the principal diseases of clover in Lithuania. Mme E. F. Karaseva (pp. 59–61) reported on new races of *Synchytrium endobioticum* [**37**, p. 593; cf. **38**, p. 274] pathogenic to formerly resistant potato vars. At the Vilnius Potato Experimental Station antisera were employed for the determination of resistance to this disease and measures are being taken to adopt this method for popular use. T. S. Efremenko (pp. 65–67), on selection and crossing for resistance to *S. endobioticum*, referred to work at the Lithuanian Experimental Station in 1950–57, in which hybrids having Agra, Zikingen, Kameraz, Krakhmalistiĭ, early Priekul'skiĭ, Pepo, Pirmunes, Primula, Skorospelỹ, or Ubel as the female parent were resistant.

Mme V. K. Kalninya (pp. 62–63), on fungicide substitutes for Bordeaux against *Fusicladium dendriticum* [*Venturia inaequalis*], reported that ferbam at 2 kg./100 l. water gave better control on Beliĭ Naliv apple and higher yield. At 0·7 kg./100 l. it reduced leaf spot (*Cladosporium fulvum*) on tomatoes by 90% to a level several times lower than that achieved by 1% Bordeaux.

I. Randalu (pp. 68–69), on the distribution and severity of helminthosporiosis of barley in the Estonian S.S.R., and its control, stated that the causal agent is *Cochliobolus sativus*, not *H. gramineum* as reported before. The disease may cause up to 30% loss; in some districts seed infection is 90–100%. Among the less susceptible vars. was Iỹgeva 453. Seed treatment with granosan or heat (53° C. for 7 min.) gave the best control. Early sowing is recommended.

I. Éĭtminavichute (p. 70) spoke on mites (fam. Oribatidae) as carriers of fungus diseases, P. Valatka (p. 73) on the control of parasitic diseases of flax, V. Slauta

& I. Paulekas (pp. 74–75) on bringing measures for the control of plant pests and diseases into general practice in Lithuania. I. K. Dagis (pp. 76–77) gave some results of experiments on the application of phytoncides [**38**, p. 272]; substances obtained from *Pulsatilla patens*, *P. pratensis*, and Chinese mustard reduced infection by *Venturia inaequalis* on apple by 45% and *P. coronata* on oats by 48%, and were used successfully for the treatment of soil infested by *Pythium debaryanum*.

Colonial research, 1957–1958.—347 pp., London, H.M. Stationery Office, 1958. 14*s*. 6*d*. net.

In the section dealing with the Commonwealth Mycological Institute (p. 27) is a list of new records including *Cercospora oryzae* [map 71] and *Leptosphaeria salvinii* on rice in Nigeria, the latter a new record for Africa; the first instance of a rust (*Melampsora* sp.) of poplar from tropical Africa (Kenya); *Tolyposporium globuligerum* [cf. **36**, p. 555], also from Kenya on *Leersia hexandra*; *Hyalodendron album* on bean [*Phaseolus vulgaris*] was received from Malaya; and *Sclerotinia ricini* on castor [*Ricinus communis*] from S. Rhodesia.

At the Forest Products Research Lab., Princes Risborough (pp. 50–51), investigations were continued by J. M. Baker into the biology and fungal relationships of the oak pinhole borer, *Platypus cylindrus*, in the tunnels of which are usually 4 spp. of fungi. One appears to be the main ambrosia fungus, designated 'A-spore', which forms chlamydospores in culture and produces small, apiculate spores in a manner resembling *Sporotrichum*. Grown on sterile oak blocks, this fungus and another resembling *Cephalosporium* both produced staining of the type associated with the tunnels. The other 2 fungi, both yeasts, caused no stain.

At the Imperial College of Tropical Agriculture, Trinidad, it was shown (pp. 57–58) that growth on artificial media of the mycelium of *Marasmius perniciosus* [see below] isolated from green cacao brooms is greatly stimulated by an aqueous extract of cacao beans or dry brooms. Mycelium from monospore cultures was similarly stimulated.

Observations in N. Borneo (p. 68) on the development of abaca [*Musa textilis*] bunchy top virus [cf. **34**, p. 381] showed that when diseased mats are planted very little symptom expression occurs, suggesting that either the incubation period is very variable and sometimes greatly prolonged, or the rate of virus multiplication and translocation is very slow. On bananas symptoms were more severe and persisted until fruiting; on abaca they were often evanescent and did not always recur. Re-infestation of plants freed from aphids by insecticides generally occurred in 3 days (range 2–14 days) over distances of 3 rows of plants.

Investigations (p. 87) by the Dept of Agric., Jamaica, into the post-harvest physiological disorder of oranges, 'brown stem', in which part of the stem end collapses and disfigures the fruit, indicated that water relations of both tree and fruit may play an important part. Attempts are in progress to reduce loss of water during handling and processing of the fruit. Leaves of healthy coconuts and those affected by 'frond drop' [**35**, p. 750] differed significantly in both P and Fe content.

Research in Kenya (pp. 91–93) showed that attacks of coffee rust (*Hemileia vastatrix*) on one group of K7 [cf. **37**, p. 513] were due to the segregation of susceptible types; another group was attacked by d'Oliveira's race I [cf. **35**, p. 164]. Field observations suggest that although this race is likely to prove a serious menace in the lower areas of Nyanza, K7 still remains less affected by rust than other vars. Its susceptibility to race I seems to vary with the climate. Spore germination was strongly inhibited by light; a water film was indispensable, and for penetration to occur the leaves must be wet by 10 p.m.; it took about 3 hr. at 23° C. and began after 7 hr. In a field trial with Burgundy mixture at $\frac{1}{4}$, $\frac{1}{2}$, 1, and 2% and perenox at the same Cu contents, the higher concs. of both gave much better control and were effective on both leaf surfaces. Captan, fermate, and

oleocuivre, all at ½%, gave about the same control as ½% Burgundy mixture. In Upper Kiambu the most critical time for spraying with phenyl mercuric acetate against coffee berry disease [*Glomerella cingulata*: **37**, p. 513] is at flowering; 20–30% increases in yield are obtainable with one well-timed blossom application. Subsequent treatments did not improve results. In the Nyeri district spraying in July and Aug. increased yields by 20%. At Kapsabet the responses obtained varied from 64% increase in SL.28 to 260% in SL.30. It is now evident that the Blue Mountain var., though the fruit is resistant, is subject to heavy loss of flower as a result of infection by *G. cingulata*. The phytotoxic effects induced by this spray [**38**, p. 206] are not so marked when insoluble Hg compounds are used.

The race of potato blight [*Phytophthora infestans*] responsible for the main attack throughout Kenya in 1957–8 was identified as 4 [cf. **36**, p. 661].

On p. 98 it is stated that in Mauritius an orchard of citrus stock-scion combinations resistant to tristeza virus has been established. Acute Zn deficiency has largely been overcome by spraying with neutralized $ZnSO_4$; high rates are required if the symptoms are not to reappear at the end of the growing season in Apr.–July. Mandarin appears to be the most suitable stock for general use in Mauritius. Tristeza resistant stocks of rough lemon are affected by canker (*Phytomonas* [*Xanthomonas*] *citri*) and of sweet orange by lack of vigour.

In Nigeria (p. 102) cowpea mosaic virus, one strain of which is a form of tobacco mosaic virus, [cf. **38**, p. 35] was widespread in the Western Region in Sept. 1957.

In Uganda (pp. 126–7) heat treatment of 4 hybrid sugarcane vars. against [sugarcane] ratoon stunting [virus] disease [cf. **36**, p. 425; **37**, p. 6] gave a 36·5% increase over a control yield of 27·4 tons/acre. There was no difference in the weights of the individual canes; yield reduction appears to be due to the production of fewer tillers. In Karamoja, where up to 20% of the sorghum heads are usually affected by smut (*Sphacelotheca sorghi*), complete control and increased stands were obtained by dressing the seed with fernasan D.

In the section (pp. 244–245) dealing with the work of the Colonial Microbiological Research Institute, Trinidad, it is stated that although pycnidia of *Guignardia citricarpa* [cf. **37**, p. 203] were found on dead grapefruit leaves under the trees, the fungus could not be found on fresh leaves or fruit. Living grapefruit bore lesions in the rind caused by a *Mycosphaerella* sp. [loc. cit.] with *Septoria* pycnidia, apparently not hitherto described on citrus. The same species was also found on leaves of mountain immortelle (*Erythrina micropteryx*) and pink poui (*Tabebuia pentaphylla*).

The Gram— bacteria of sugarcane leaves with 'stripe' symptoms may be differentiated on glucose metabolism, the group with an oxidative (anaerogenic) metabolism including all the *Pseudomonas* and *Xanthomonas* spp. *X. albilineans* has not been found in Trinidad; it has been studied with isolates from Martinique and St. Lucia [**37**, pp. 72, 206]. An organism resembling *X. vasculorum* [map 3] was isolated from sugarcane [in Trinidad], though only resistant vars. are now grown in the W. Indies. In Trinidad tomatoes and bananas are severely affected by *Pseudomonas solanacearum* [cf. **38**, p. 55] and attempts at control by systemic antibiotics are in progress. All fresh isolates of *P. solanacearum* have displayed classical smooth-rough variation correlated with virulence. Virulent strains from banana are less virulent on tomato.

Studies in collaboration with the Plant Physiology Section, Imperial College of Tropical Agriculture, showed that under various conditions in which culture filtrates of *Gibberella fujikuroi* markedly stimulated growth of cacao plants, *Marasmius perniciosus* [see above] was either inactive or inhibitory. Compounds of the gibberellin type do not appear to be involved in witches' broom disease of cacao.

Of 3,500 isolates of soil actinomycetes examined for antibiotic activity, 150 were

tested by chromatography to differentiate their products from antibiotics already described. Of 74 extracts containing apparently new antibiotics, 60 contained only polyenes, 6 contained other substances as well, and 8 gave only active substances which are not polyenes. These last 14 isolates are now being studied to determine the opt. conditions for the production of the non-polyene antifungal antibiotics. The Hankey culture collection has been maintained.

STAPLES (R. R.). **Report of the Department of Research & Specialist Services [Southern Rhodesia] for the Year Ended 30th September, 1957.**—*Rep. Minist. Agric. Rhod. Nyasald 1956–7*, pp. 7–86, 1958. 10*s.* 6*d.*

In the report on Botany, Plant Pathology, and Seed Testing (pp. 79–86) G. R. BATES [cf. **37**, p. 134] states that new host and disease records include *Phytophthora infestans* on *Datura stramonium*, stem canker of cabbage (*Phoma lingam*) [map 73], leaf spot of eggplant (*Cercospora solani-melongenae*), and leaf spot of chicory (*C. cichori-intybi*). Two other interesting records were of *Phoma* sp. and *Cercospora* sp. attacking the maize parasite *Striga asiatica*.

The 1st epiphytotic of tobacco anthracnose (*Colletotrichum tabacum*) [**36**, p. 380] developed during Nov.–Dec. 1956, chiefly in seedbed plantings; there were also considerable losses in the field. On Turkish tobacco it was 1st recorded in Jan. 1957, being widespread in seedbeds, some of which were totally destroyed.

Silver scurf (*Spondylocladium* [*Helminthosporium*] *atrovirens*) [map 233] was prevalent on Voran potato tubers at the Salisbury Experiment Station. The 1st outbreak of blackleg (*Erwinia atroseptica*) in a potato crop from imported Netherlands seed affected approx. 5% of the stand in a 1st irrigation planting at Enterprise. Investigations indicated that *Pseudomonas solanacearum* could be introduced into heavy soils by infected potato tubers and might survive the dry season, depending on soil moisture conditions.

Several cases of severe chlorosis in young maize plants during Nov. were attributed to low soil temps. during prolonged wet weather. The increased prevalence of maize seed infection by *C. graminicola* was noted, and this sp. was also associated with a leaf spot disease of maize, new to S. Rhodesia [cf. **24**, p. 442].

A leaf spotting disease of castor bean [*Ricinus communis*] (*Xanthomonas ricinicola*) appeared on young plants in several districts but caused little damage. Subsequently *Alternaria ricini* [map 345] became widely established; although primarily causing leaf spot the fungus may attack fruiting heads with consequent reduction in yield; circumstantial evidence suggests it to be seed-borne. Other diseases on this host included a leaf spot due to *Cercospora ricinella* and rust (*Melampsora ricini*) [cf. **35**, p. 423]. Grey mould caused by *Sclerotinia ricini* was present on the fruiting heads in experimental plantings of hybrids at Hartley.

Cowpea leaf spot (*Ascochyta phaseolorum*) [cf. **35**, p. 163] was prevalent and resulted in considerable losses in the Mazoe Valley; the fungus also caused leaf spotting of Mung bean [*Phaseolus aureus*] and *Dolichos* bean [*D. lablab*]. *Cercospora canescens* also caused a leaf spot of cowpea. As a result of control measures for stem break disease [*Colletotrichum curvatum*] of sunn hemp [*Crotalaria juncea*: **36**, p. 381], as recommended, only 1 case of the disease was reported. The seed-borne nature of the disease was further confirmed [**35**, p. 678]. Mosaic symptoms almost certainly due to virus were found on sword bean (*Canavalia ensiformis*) [cf. **27**, p. 550]. *Puccinia coronata* damaged a hybrid (HI) of *Lolium perenne*×*L. italicum* and also attacked Italian rye grass and oats. *Armillaria* [*mellea*] root rot destroyed a considerable acreage of tea on an estate on the Eastern Border.

Septoria lactucae damaged lettuce plantings. Several reports of leaf curl (*Taphrina deformans*) [map 192] on peach were received. Mildew (*Uncinula necator*) [cf. **30**, p. 309] was prevalent on grape vines in many parts of the country during Dec.

and Jan. An extensive search for latent black spot (*Guignardia citricarpa* [map 53]) in citrus plantings throughout the Colony failed to reveal its presence. Three cases of tomato spotted wilt virus in dahlia were traceable to a source in the Netherlands, whence importation has now ceased.

Conditions favoured the widespread development of black spot (*Diplocarpon rosae*) on roses during the summer months. *Fusarium* wilt of carnations was frequently reported and sometimes caused considerable loss. The fungus causing scab of French beans [*Phaseolus vulgaris*: **37**, p. 135] is now designated *Elsinoe phaseoli* Jenkins f. sp. *vulgare*. Field experiments suggest that it is seed-borne. French bean vars. tested varied markedly in susceptibility, pole and haricot beans were resistant. Both scab and anthracnose (*Colletotrichum lindemuthianum*) were controlled by thiram, maneb, or zineb applied at and shortly after flowering.

The first recorded epiphytotic of *Phytophthora infestans* on tomato occurred in summer plantings. Maneb gave the best control of both leaf and fruit infection [**38**, p. 280].

Bordeaux mixture (4:6:50) effectively controlled *Alternaria* [*dauci*: cf. **33**, p. 401] on carrots. *Cercospora* [*Mycosphaerella*] *arachidicola* on groundnuts was equally well controlled by copper oxychloride (somewhat phytotoxic), maneb, and S dust [cf. **37**, p. 514].

There were no significant differences between 17 fungicidal dressings on chipped and healthy maize seed, though seedlings from chipped grain were fewer and lighter. The planting of grain severely infected by *Diplodia zeae* [*D. maydis*] alongside chipped and healthy grain caused retarded emergence and lowered the weight of seedlings but caused no rotting. Some maize hybrids with considerable tolerance of *D. maydis* have been found, one of which is also fairly resistant to *Fusarium graminearum* [**36**, p. 380]. The stubble mulch trial showed *Fusarium moniliforme* [*Gibberella fujikuroi*] ear rot to be related to stalk borer [*Pyrausta nubilalis*] damage [cf. **38**, p. 141] which increased on trash plots or with high N; the latter markedly decreased *D. maydis* infection accentuated by stubble mulching. A strong correlation was established between yield and damage by *G. fujikuroi* stressing the considerable bearing of stalk borer damage on maize yield.

Simmonds (J. H.). **Science Branch, Plant Pathology Section.**—*Rep. Dep. Agric. Qd 1957–58*, pp. 58–59, 1958.

The winter-spring period was again [cf. **37**, p. 205] abnormally dry in S. Queensland. Leaf blast and head blight (*Piricularia oryzae*) [**29**, p. 202] of *Setaria*, on the increase over recent years, was again epidemic, with severe losses. Dwarf Panicum was very susceptible, whereas Nunbank and *S. italica* were resistant. Captan (5–20%), used as a seed dressing against sorghum covered kernel smut [*Sphacelotheca sorghi*: **33**, p. 209], proved a suitable substitute for organic mercurials.

Organic fungicide seed dressings such as captan controlled crown rot (*Aspergillus niger*) on groundnuts but were ineffective against *Rhizopus arrhizus*, and should be used in combination with mercurials (1:2).

Benzyl salicylate, zineb, and home-made cuprous-oxide, in that order of merit, successfully controlled tobacco blue mould [*Peronospora tabacina*: **37**, p. 510], the last named giving the best check to vascular infection.

Ginger rhizome rot (*Fusarium oxysporum*) [**36**, p. 307] was controlled better by seed-piece treatment with an organic mercurial than with captan.

In the final experiments on the control of banana leaf spot (*Mycosphaerella musicola*) copper oxychloride and zineb proved efficient substitutes for Bordeaux mixture but white oil and malachite green must be added [**37**, p. 49] as their presence ensures complete control.

No fungus could be proved responsible for isolated wilt in pineapples. From

fruit affected by core rot 2 *Fusarium* and 3 *Penicillium* spp. have been isolated and shown to be pathogenic to both ripe and green fruit [cf. **36**, p. 536]. Increasing humidity or inoculum did not effect incidence of infection for which, however, injury is essential.

The Phenomenal strawberry var. displayed a 'yellows' type of virus disease infection.

Passion fruit vines inoculated with mild strains of the Queensland woodiness virus [strain of cucumber mosaic virus: **33**, p. 98] gave much higher yields and better quality fruit than those inoculated with the normal strain.

No resistance to tomato leaf shrivelling virus [**37**, p. 249] has yet been found in any commercial var. or in any hybrid with *Lycopersicon peruvianum*. A virulent outbreak of leaf and fruit spot caused by *Corynespora cassiicola* [cf. **36**, p. 667] was noted on tomatoes.

Sclerotinia homoeocarpa [cf. **36**, p. 324] on blue couch (*Digitaria didactyla*) was adequately controlled by fortnightly spraying with an organic mercurial, P.A.C.A., or thiram; Hg salts were highly phytotoxic and captan mildly so.

Phytophthora cinnamomi [cf. **38**, p. 104] was isolated from soil near 15–20-year-old trees of *Pinus taeda* and *P. elliottii* affected by root rotting; its possible pathogenicity is under investigation.

Symposia held during the 45th Indian Science Congress at Madras from 7–9th January 1958.—*Mem. Indian bot. Soc.* 1, pp. 1–159, 1 pl., 1 fig., 1 graph, 1 map, 1958.

The 1st of these 3 symposia, dealing with modern trends in plant taxonomy, includes a contribution by C. V. Subramanian (pp. 43–51) on the taxonomy of fungi, with some examples of departures from the classical taxonomy enforced by the International Rules which have occurred during the past 20 yr., a period referred to as one of 'experimental' taxonomy.

In the 2nd symposium, on physiology of micro-organisms, R. K. Saksena (pp. 71–76) reviews the vitamin requirements of fungi. Multiple vitamin deficiencies are more common in yeasts than in filamentous fungi; the former have a greater deficiency for biotin and the latter for thiamine, for which yeasts are usually autotrophic. No deficiencies for riboflavin or *p*-aminobenzoic acid have been found in filamentous fungi. Vitamin requirements do not appear to provide a clue to the systematics of fungi. Miss L. Saraswathi-Devi (pp. 82–86) describes the *Aspergillus niger* technique for bioassay of heavy metals [cf. **38**, p. 63] and suggests that other micro-organisms sensitive to high doses of these metals should be sought to assist the rapid evaluation of toxicities in soils. Dealing with the role of toxins in vascular wilts, D. Subramanian (pp. 87–90) comments on the difficulty of separating the direct effects of metabolism of the causal fungus from the indirect effects (via products from the killed or injured host cells). N. S. Subba-Rao (pp. 91–93) discusses under the title 'phytotoxaemia' various host responses to fungal toxins and suggests the use of unicellular green algae grown under standardized conditions for toxin assays. Miss K. Bhuvaneshwari (pp. 98–101) comments on root exudates in relation to rhizosphere effect [cf. **38**, p. 208]. C. S. Venkata Ram (pp. 102–106) deals with cellulose decomposition by fungi. While root pathogens of certain crop plants probably utilize the host cellulose as a C source, the extent to which they can elaborate toxins or antibiotics on different cellulosic substrates remains to be investigated. J. Venkateswarlu (pp. 107–110) treats the genetics of micro-organisms and M. S. Swaminathan and A. T. Ganesan (pp. 111–116) mitosis in yeasts.

In the 3rd symposium, on floristic studies in India, K. Ramakrishnan (pp. 140–144) surveys the fungal flora and compares it with that of S. Africa. R. S. Rao (pp. 152–159) discusses the history and importance of Indian herbaria.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **6**, 12, p. 189, 1958.

Reporting from the Republic of the Philippines, G. M. Reyes and B. M. Legaspi state that *Ustilago maydis* [map 93] was recorded again, after many years, from 2 localities in 1955 on one plant each of nursery maize and a new introduction.

The Caribbean Commission report from Port of Spain, Trinidad, that an outbreak of *Ceratostomella* [*Ceratocystis*] *fimbriata*, associated with attack by *Xyleborus* shot-hole borers, killed a limited number of cacao trees in Trinidad recently, notably in the northern and central ranges. This is stated to be the 1st recorded instance of the death of cacao trees from this cause.

III Reunión Interamericano de Fitogenetistas, Fitopatólogos, Entomólogos y Edafólogos. Bogotá, D.E. — Colombia, 20 de Junio a 1° de Julio de 1955. [III Inter-American Conference of Phytogeneticists, Phytopathologists, Entomologists and Soil Scientists. Bogotá, D.E.—Colombia, 20 June to 1 July 1955.] —xvi+459 pp., 11 pl., Ministeria de Agricultura de Colombia, Departamento de Investigación Agropecuaria, D.I.A. Oficina de Investigaciones Especiales, O.I.E. Bogotá, 1958.

Some of the contributions to this conference have already been noticed. In his opening address E. C. Stakman discussed plant pathology in Latin America and the U.S.A. generally (pp. 27–40). R. N. Reyes and L. A. Pena (pp. 139–140) reported on sources of resistance to wheat rusts in Colombia; 13 vars. resistant to *Puccinia graminis* f. sp. *tritici*, 13 to *P. triticina*, and 18 to *P. glumarum* are listed. A. R. Da Silva (pp. 141–143) urged that the study of physiologic races of wheat rusts should be planned in order to be of max. assistance to plant breeders. While introduction of a new var. into a region reduces or eliminates the races or biotypes to which it is resistant, it may permit the increase of others previously of little importance, either because the vars. grown there were not susceptible, or because of competition with other races. A breeding programme should be evolved to concentrate in one var. resistance to a max. number of races [cf. **35**, p. 6]. E. C. Stakman (pp. 200–201) stressed the importance of coordinating field and greenhouse research work on wheat diseases.

As a result of the inoculation of maize in Colombia in 1954 R. L. Skiles, C. A. Cardona, & O. N. Barros (pp. 203–204) found the best resistance to rots of the root and cob caused by spp. of *Fusarium* and *Diplodia* [**37**, p. 280] in lines derived from Colombia 2 and ETO, Bra. 2, Bra. 7 PL, Cateto 483, PTR. 10, PTR. 1, and Colombia 1 and from Ven. 1×Mex. 63–659–3. R. N. Paris (pp. 206–207) reported a dwarfing of wheat and barley in experimental plots at the Granja de Obomico, Nariño, in 1953. The affected plants sometimes failed to flower, or produced a few, small ears with little or no grain. Among the vars. observed were some with both normal and dwarfed plants; others were consistently healthy or affected. The cause of the disease is unknown. J. J. Costa & Dora Fandiño (p. 208) referred to a new method [not specified] for obtaining HCB '66' [**36**, pp. 391, 460], which at a min. of 6% dry, at 200 g./100 kg. wheat seed, proved excellent against bunt [*Tilletia* spp.].

E. M. Rojas & A. F. Swanson (pp. 209–210) surveyed the occurrence of *P. graminis* on wheat in Peru [**37**, pp. 637, 766]. Races 10 and 78 were first isolated in the Puno region in 1954. Race 17, first identified in Lima in 1950, was now to be found throughout Costa Rica. The most virulent of the races and biotypes studied was 15 B-IP [**36**, p. 93]. Studies on the development of *P. graminis* in the greenhouse and in the field in Chile [**37**, p. 766] were presented by Dora Volosky de Hernandez (pp. 211–212). The high measure of correlation obtained opened up the possibility of doing most of the work on resistance to race 15 in the greenhouse. In 1952 the same author (pp. 213–214) tested 714 lines of wheat for resistance to *Tilletia* spp., seed inoculated with a spore mixture being sown in the field and the

test repeated in 1953 with the more resistant lines. Seven lines from Kenya × Sta Catalina × Corazón, 6 from Thatcher × Sta Catalina, and the vars. Gigante Inglés, Hope × Thatcher 2706, Hope × Thatcher 489, Mercury, Pilot IB 2687, and Poland were resistant. The results of tests by the same author (p. 215) of the reaction of 540 lines of wheat to *P. glumarum* [**34**, p. 777] under field conditions (natural infection) and in a greenhouse (inoculation) at Santiago in 1952 showed a high measure of correlation. In the field (pp. 216–217) the most resistant lines were from Kenya × Lincoyán, Premier × Sinvalocho, Thatcher × Lincoyarán, Sta Catalina × Lincoyán, and Thatcher × Sta Catalina (0–5% infection) and the vars. Buck la dulce, Marquillo, and Río Negro (each 2%), Thatcher Row 2281 (0·7) and H–194–11 Row 221 0, Frontana, and Kenya (each 0%).

G. P. Albornoz & E. H. Casseres (pp. 228–229) described yield tests of 10 selected potato clones from the U.S.A. and 7 local commercial vars. in 4 different climatic zones in Costa Rica in 1954. In the regions where infection by *Phytophthora infestans* [**33**, p. 712] was most virulent the best yields were from clones HIQ–1 and HLT–6; though somewhat less resistant, HDY–8 and 3 VW–9 also yield well, most of these having the genes R_1 R_2 for resistance. The max. yields were obtained at Cot (1800 m.) from clones HIQ–1, HLT–6, and 3 WH–9 in plots where fungicidal control combined with genetic resistance satisfactorily reduced the pathogen. S. M. Idrobo (p. 230) reported that of several products tested at the Estación Experimental Tibaitatá, Colombia, for the treatment of potato 'seed' pieces against rot in the soil manzate gave 80–90% germination compared with 15–20% in the untreated. F. J. Lebeau (pp. 231–232) referred to trials of potato vars. for resistance to *P. infestans* in Guatemala [**34**, p. 243] in 1954; Kennebec, Cherokee, and Pungo remained free from infection at Chimaltenango. A. Montaldo (pp. 233–234) discussed the various diseases of potatoes in Chile and methods for their control. J. A. B. Nolla (pp. 235–236) described a severe outbreak of *P. infestans* on potato and tomato in W. Puerto Rico at an altitude of 330 m. where, so far as is known, potatoes had never before been cultivated. The pathogenic race concerned was distinct from that commonly occurring in the U.S.A. D. Thurston (p. 239) stated that the races of *P. infestans* collected most commonly round Bogota, Colombia, were 0 and 1; others were 4, 1,4, and 1,3,4. He concluded that the international system for designating the interrelation of genes and races is not practicable unless all workers use exactly the same differentials. K. Silberschmidt (p. 237) reported from São Paulo, Brazil, that a variant of potato virus Y described in 1954 [**34**, p. 264] has been useful in cross-protection tests on White Burley tobacco for the identification of other strains of that group. The same author (p. 238) described sap inoculation and *in vitro* tests with an isolate from a Bolivian potato var. Imilla Blanca, which showed that it belonged to the potato virus [Y] group. However, on White Burley tobacco the symptoms were unlike those caused by many other variants of the same virus; numerous white, necrotic spots were restricted to the inoculated and adjacent leaves and a few weeks later the new leaves showed no symptoms, the plants having recovered.

Lucy Hastings de Gutierrez & M. G. Gutierrez (p. 249) observed that when 36 rice vars. were inoculated [method unspecified] with *Helminthosporium oryzae* [*Cochliobolus miyabeanus*] at Turrialba, Costa Rica, there was a highly significant negative correlation between degree of infection and yield. R. L. Skiles, C. A. Cardona, & O. N. Barros (pp. 250–251) noted that in treatments of *Crotalaria juncea* seed against root rot [**35**, p. 166] arasan, zerlate, rootone, and spergon gave best results in that order, arasan increasing germination by 10%.

Martin (H.). **The scientific principles of crop protection. Fourth Edition.**—viii+ 359 pp., London, E. Arnold & Co., 1959. 65*s*.

The basic layout of the 3rd edition [**19**, p. 485] has been retained, but increased

knowledge of the mechanisms of toxicity has permitted a coordinated treatment, with a discussion of general principles preceding treatment of the several groups of pesticides. The biochemistry and toxicology of the new synthetic pesticides are covered, but technical data are omitted as being readily available elsewhere [**38**, p. 180]. The emphasis throughout is on the physico-chemical aspects of control.

Scurti (J. C.). **Le malattie delle piante. Parte prima. Malattie da virus e da parassiti vegetali.** [Plant diseases. Part one. Diseases caused by viruses and plant parasites.]—viii+390 pp., 4 col. pl., 191 fig., Turin, Loescher (Editore), 1958. L. 2,500.

This profusely illustrated work is intended for students. All the diseases of Italian crops [**38**, p. 240] and plants receive attention, the treatment being in relation to their importance. The section on diseases caused by fungi (pp. 140–318) includes simple analytical keys to classification; that on bacterial diseases (pp. 120–138) groups them according to the changes induced in the host. Virus diseases (pp. 101–120) are arranged according to hosts and to the symptoms on indicator plants. Non-parasitic diseases cover pp. 53–100 and parasitic phanerogams pp. 319–328. The volume begins with a general introductory section (pp. 1–53) covering main principles and including a note on the organization of phytopathological studies in Italy. There is a useful vocabulary of technical terms (pp. 329–350), a host index (pp. 351–368), and a general index.

A companion volume, by S. P. Oletta, deals with diseases caused by animal parasites.

Ceruti (A.). **Elementi di biologia dei virus, batteri e funghi.** [Elements of the biology of viruses, bacteria, and fungi.]—46 pp., 37 fig., Turin, Loescher (Editore), 1957. L. 900.

Pp. 1–7 deal with the biology of viruses, with some reference to bacteriophages. Pp. 8–22 deal with bacteria. The remaining section covers fungi, and deals *inter alia* with structure, antibiotic production, pigmentation, nutrition, growth in culture, and reproduction.

Ni vigtige plantesygdommes livsløb. [The life-histories of nine important plant diseases.]—2 pp., 8 col. pl., Statens Plantetilsyn, København, 1958.

This is an attractively produced popular advisory booklet.

Cochrane (V. W.). **Physiology of fungi.**—xiii+524 pp., 66 graphs, New York, John Wiley & Sons, Inc.; London, Chapman & Hall, 1958. 78*s*.

This books deals mainly with the filamentous fungi and actinomycetes, work on yeasts being included only where it bears on fungal physiology. The subject matter includes cultivation and growth; the composition of fungus cells; C nutrition; C metabolism (3 chap.); respiration; N nutrition and metabolism; inorganic nutrition and metabolism; vitamin requirements of fungi; reproduction; spore germination; and the action of physical and of chemical agents. Each chapter concludes with an extensive bibliography and separate indexes are given for subjects and organisms.

Dye (D. W.). **Host specificity in Xanthomonas.**—*Nature, Lond.*, **182**, 4652, pp. 1813–1814, 1 fig., 1958.

Because the host ranges of most spp. of *Xanthomonas* have never been completely determined and the classification of the genus is not securely established, inoculations were carried out at the College of Agriculture, Edinburgh, on Canadian Wonder bean (*Phaseolus vulgaris*) leaflets at the 1st trifoliate leaf stage, punctured in the midrib with a sterile needle and a small quantity of a culture of 18 spp. and

2 vars. of *Xanthomonas* from 20 hosts placed on the leaflet by pipette. Inoculum was also placed without puncturing on the unfolding trifoliate leaves. The process of inoculation, isolation, and re-inoculation was carried out 4 times. A progressive disease was produced by all the cultures, dark green-black angular lesions 2–4 mm. in diam. appearing at the sites of puncture, and the veins showing browning and collapse for 3–5 mm. Some lesions as they aged became light brown and yellow chlorotic areas developed round many. On parts which had not been pricked, dark green, water-soaked angular spots developed, particularly on the younger leaves. When lesions coalesced the effects were frequently severe and caused defoliation. The lesions which developed without tissue damage were regarded as good reproductions of natural infections and were considered as proof that the bacteria had become adapted to their new host. This type of infection could not invariably be distinguished from that caused by *X. phaseoli*, though this organism frequently caused a more extensive pale green necrosis and wilting.

Wakimoto (S.) & Yoshi (H.). **Studies on the multiplication of OP_1 phage (Xanthomonas oryzae bacteriophage). 2. Interference phenomena in the multiplication between OP_1 and OP_{1t}, the growth temperature mutant obtained from OP_1.**—*J. Fac. Agric. Kyushu Univ.*, **11**, 1, pp. 53–61, 1 pl., 1957.

In further studies [**36**, p. 123] a mutant (OP_{1t}) of the OP_1 bacteriophage of *X. oryzae* [cf. **37**, p. 757] was distinguished by its opt. growth temp. of 25° C. On simultaneous invasion of the same bacterial cell both phages multiplied and were released in a definite proportion, according to their rate of reproduction. There was scarcely any difference in average burst size between mixed and simple infections.

Niklas (O. F.). **Auftreten und Periodik verschiedener Krankheiten und Parasiten bei Larven des Maikäfer (Melolontha spec.).** [The occurrence and periodicity of various diseases and parasites of the Cockchafer (*Melolontha* sp.).]—*Entomophaga*, **3**, 1, pp. 71–88, 23 graphs, 1958. [English summary.]

A survey from the Institut für biologische Schädlingsbekämpfung, Darmstadt, Germany, of causes of death of cockchafer larvae in a forest at Lorsch. Among the mycoses *Beauveria bassiana* infection [cf. **37**, p. 639; **38**, p. 178] was the most important (68%), followed by *Fusarium* sp. (21%). Larvae infected by *B. bassiana* were, typically, pink or purplish red, somewhat shrunken, and hard.

Chamberlain (E. E.) & Atkinson (J. D.). **Certification of therapeutants and plant hormones.**—*Inform. Ser. Dep. sci. industr. Res. N.Z.* 13, 21 (unnumbered) pp., 1958.

A revised list [cf. **37**, p. 139].

Thompson (C. C.). **The efficiencies of wetting agents used in agricultural sprays.**—*J. Sci. Fd Agric.*, **9**, 10, pp. 650–657, 1958.

Eight proprietary wetters (unnamed, designated by the letters A–H, details on request) were examined at the Plant Pathology Laboratory, Harpenden, Herts., at room temp. (17·3–21° C.). In preliminary tests with F (ionic) on leaves of 5 apple and 5 pear vars. there was little intervarietal variation in the wetting achieved. The main tests were on 1 var. each of pear, apple, and cabbage, the wetters being mixed with standard fungicides. Of 3 physical determinations made on solutions of the wetters, only the Draves sinking-time test (*Amer. Dyest. Reptr*, **20**, p. 201, 1931) gave reasonable correlation with wetting efficiency on leaves (area wetted): surface and interfacial tension values [cf. **35**, p. 206] gave little indication of the increase in efficiency of B on cabbage leaves over the range 0·1–0·3%, while B and F differed considerably at 0·1% though they were in fact of comparable efficiency. Thus, reduction of surface tension was not closely related to wetting ability [cf. Hamilton. Abs. in *Rev. appl. Ent.*, Ser. A, **18**, p. 409, 1930]. To the time of

writing the author had not obtained good correlation between the wetting of waxed disks and of leaves. Some of the ionic wetters were precipitated in the presence of $CuSO_4$, $MgSO_4$, $NaNO_2$, and lime-sulphur, at high conc. Thus F, quite satisfactory under certain conditions, was among those most affected: cabbage leaves, completely wetted by a 0·25% sol., were wetted only about a quarter when $CuSO_4$ (2·5% w/v) was present. Bordeaux and Burgundy mixtures also affected several ionic wetters adversely [**37**, p. 573]. Apart from D, which is rather insoluble, non-ionic wetters had the advantage of being unaffected by the pesticides examined. It is concluded that the efficiency of a wetter depends on the composition of the spray with which it is used and on the nature of the surface being sprayed; compatibility also must be considered.

Burgundy mixture.—*Agric. Gaz. N.S.W.*, **69**, 10, p. 529, 1958.

A useful popular note on preparation and use.

Fawcett (C. H.), Spencer (D. M.), & Wain (R. L.). **Investigations on fungicides. IV. (Aryloxythio)trichloromethanes.**—*Ann. appl. Biol.*, **46**, 4, pp. 651–661, 1 pl., 1958. [16 ref.]

In further studies at Wye College, Kent [cf. **36**, p. 709; **37**, p. 209], 20 (aryloxythio)trichloromethanes were directly fungistatic *in vitro* to *Pythium ultimum*, *Sclerotinia fructigena*, *Verticillium albo-atrum*, *Botrytis cinerea*, *Aspergillus niger*, and *Alternaria solani* and some had a fumigant action. Good protection against subsequent inoculation with *A. solani* on tomato and *B. fabae* on broad bean was afforded by some of the compounds, but none was better than 3 standard protectants, thiram, tetramethylthiuram sulphide, and captan. Supplied through roots, 8 compounds gave significant systemic fungicidal protection against *A. solani* in tomato, but there was no significant protection against *B. fabae* in broad bean. In preliminary tests the 2:4:5-trichlorophenoxythio analogue gave promising results as a fumigant for the prevention of infection by downy mildew (*Bremia lactucae*) on lettuce, for the reduction of lenticel rot in apples dipped in a spore suspension of *Gloeosporium* [*Neofabraea*] *perennans* and stored for 14 weeks at 15° or 4° C., and for the prevention of blue mould (*Penicillium italicum*) in pricked inoculated oranges.

Soenen (A.) & Grossmann (B.). **Un nouveau fongicide organique le 1-chloro-2,4-dinitronaptalene.** [A new organic fungicide, 1-chloro-2,4-dinitronaphthalene.]—*Agricultura, Louvain*, Sér. 2, **6**, 2, pp. 183–238, 9 graphs, 1958.

A copiously tabulated survey is presented of experiments performed at the Centre de Recherches de Gorsem, St. Trond, Belgium, in 1956 and 1957, which demonstrated the efficacy of CPR 32 (70% 1-chloro-2,4-dinitronaphthalene) against a number of plant pathogens, including *Coryneum beijerinckii* [*Clasterosporium carpophilum*], *Megalocladosporium* [*Fusicladium*] *carpophilum*, and *Taphrina deformans* on peach, *Pseudopeziza ribis* on gooseberry, *P. tracheiphila*, *Plasmopara viticola*, and *Oidium tuckeri* [*Uncinula necator*] on vine (combined with S for the last), *Phytophthora infestans* on potato and tomato, *Cladosporium fulvum* on tomato, *Septoria apii* on celery, *Pseudoperonospora humuli* on hops, and *Melampsora populnea* on poplar.

CPR 32 augmented the yields of vine, potato, tomato, and hops, and induced elongation of vine tendrils, poplar shoots, tomato stems, and hop bines. There is considered to be no doubt of its excellence as a fungicide. For certain purposes it proved superior to a number of other standard preparations tested.

Ferenczy (L.). **Quaternär ammoniumvegyület baktériumellenes magcsávázasra.** [A quaternary ammonia compound as a bactericide for seed treatment.]—

Növénytermelés, **5**, 2, pp. 177–184, 1956. [Russian & English summaries. Abs. in *Referat. Zh. Biol., 1958*, 18, p. 209, 1958.]

At the Institute of Physiology, Szeged University, Hungary, sterogenol (cetylpyridinium bromide) at 1:7000 was successful against *Xanthomonas malvacearum* and *Bacterium* [*Bacillus*] *cereus* var. *mycoides* on inoculated [cotton] seeds; 1% and 5% solutions for 20 min. decreased germination.

Trolle-Lassen (C.). **Den fungistatiske effekt af sorbinsyre og andre konserveringsmidler.** [The fungistatic effect of sorbic acid and other preservatives.]—*Arch. Pharm. Chemi*, **65**, 19, pp. 679–685, 1 graph, 1958. [English summary.]

At Danmarks Apotekerforenings Kontrollaboratorium, Copenhagen, the efficiency of sorbic acid [cf. **36**, p. 203; **38**, p. 185] (0·005–0·15%) as a preservative for pharmaceutical preparations was tested by a serial-dilution technique against strains of *Aspergillus*, *Penicillium*, and *Mucor* in comparison with benzoic acid, methylparaben, and sodium propionate (same conc.), and benzalkonium chloride and phenylmercuric acetate (both at 0·00025–0·008%). The last 2 were the most potent and sodium propionate the least. Methylparaben was moderately and consistently effective over the full range of pH values tested (3–9), whereas the activity of sorbic and benzoic acids, satisfactory at the higher values, declined at the lower.

Ten Houten (J. G.). **Het belang van de fytopathologie voor de menselijke samenleving.** [The importance of phytopathology for human coexistence.]—*Meded. LandbHogesch. Gent*, **23**, 3–4, pp. 561–572, 1958. [11 ref.]

Information is presented in this lecture at the 10th Symposium of Pharmacy and Phytiatry on the social and economic consequences of plant epiphytotics, illustrated by some well-known examples, and on the possibilities of control by breeding for resistance and by chemotherapy.

Beran (F.). **Besteht eine Tendenz zur Zunahme von Pflanzenkrankheiten und -schädlingen?** [Is there a tendency of plant diseases and pests to increase?]—*Pflanzenarzt*, **11**, 10, pp. 110–112, 1958.

Following a brief consideration of the position with respect to cereals, potatoes, beet, fruit, and vine growing, the author concludes that there is no evidence for an overall increase of pests and diseases in Austria.

Das Gupta (S. N.). **History of botanical researches in India, Burma and Ceylon. Part I. Mycology and plant pathology.**—iv+118 pp., Bangalore City, Bangalore Press (for the Indian Botanical Society), 1958. Rs. 5. [69 pp. ref.]

This is the 3rd (but the 1st to be published) of a series of 15 projected reviews of research during the last 100 years. It deals with the taxonomy and morphology of fungi (pp. 2–14); physiology (pp. 14–20); cytology (pp. 20–22); genetics (pp. 22–24); fungus diseases of plants (pp. 25–37); bacterial (pp. 37–40), virus (pp. 40–47), and physiological diseases (pp. 47–49); and lichens (pp. 49–50). The bibliography has been made as complete as possible.

Mode (C. J.). **A mathematical model for the coevolution of obligate parasites and their hosts.**—*Evolution*, **12**, 2, pp. 158–165, 1958.

From the Dept of Mathematics, Montana State College, Bozeman, the author presents a model host-parasite system and a theory of the evolutionary significance of the genetic system revealed, e.g., by studies on wheat bunt (*Tilletia caries*), barley mildew (*Erysiphe graminis*), and flax rust (*Melampsora lini*). Present-day systems are considered to be relics of the ancient system of balanced polymorphism, which originated during an epoch when the hosts reproduced by outbreeding. Such

a state of duality is postulated to have been essential for the evolution of obligate parasites and their hosts.

Hoffmann (G. M.). **Untersuchungen zur Ätiologie pflanzlicher Actinomykosen.** [Studies on the etiology of plant actinomycoses.]—*Phytopath. Z.*, **34**, 1, pp. 1–56, 15 fig., 1 map, 1958. [English summary. 78 ref.]

From the Institut für Phytopathologie, Aschersleben, Germany, a review is given of the occurrence and distribution of plant diseases caused by actinomycetes with particular attention to the knowledge so far available on the etiology of potato and beet scabs.

Investigations on 183 samples of scabbed potato tubers [**33**, p. 556] from the main infection zones in Germany led to the isolation of 12 different *Streptomyces* spp. Numerous inoculations with 20 identified spp. on a number of susceptible potato vars. in greenhouse and field in 1954 and 1955 showed that *Streptomyces scabies* [loc. cit.] can be regarded as the sole pathogen of potato scab. Reisolation indicated that some of the spp. used for inoculation might be slightly pathogenic.

True beet scab [**36**, p. 743] is etiologically identical with potato scab and is caused by *S. scabies*. The other 14 spp. isolated from beets, all but one identified, were not parasitic under greenhouse and field conditions. Strains of *S. scabies* isolated from beets and potatoes were identical in pathogenicity.

Strains of *A.* [*S.*] *griseus* [**34**, p. 388], which displayed a high degree of virulence in the soybean test [**28**, p. 539; **33**, p. 556], were isolated from scab-infected beets, but were not nearly so aggressive on potato and beet as *S. scabies*. On potato tubers in the greenhouse a slight browning of the periderm was produced and on beets a slight cracking.

The number of supposedly pathogenic spp. has been greatly reduced by these studies, the following being found non-pathogenic to plants in inoculation tests in a greenhouse: *A. chromogenes*, *A.* [*S.*] *candidus*, *A.* [*S.*] *globisporus*, *A.* [*S.*] *intermedius*, *A.* [*S.*] *griseus*, *A. longisporus ruber* [*S. longispororuber*], and *A.* [*S.*] *setonii*. Some of the original cultures of species reported to be parasitic by some workers have been shown to consist of a saprophytic species accompanied by a pathogenic one.

Geard (I. D.). **The role of therapy in the control of plant diseases.**—*J. Aust. Inst. agric. Sci.*, **24**, 4, pp. 312–318, 1 graph, 1958. [28 ref.]

In this expansion of a Presidential Address to the Tasmanian Branch of the Australian Institute of Agricultural Science, delivered in Feb. 1958, the author discusses the subject under the main headings of economic and practical limitations, inherent difficulties in plant disease therapy, heat- and chemotherapy of virus-infected plants, chemotherapy of bacterial and fungus diseases, and antibiotics, concluding with indications of future developments.

Skelly (J. K.). **Mildew and rot-proofing.**—*Text. Cord. Quart.*, **7**, 1, pp. 30–35, 37, 1958.

Much of the information in this useful review from N. Ireland of up-to-date methods for the protection of textiles against microbiological deterioration caused, *inter alia*, by *Aspergillus*, *Penicillium*, and *Chaetomium* spp. has already been noticed, but the following items may be mentioned. Among the fungicidal phenolic compounds pentachlorophenol laurate [**35**, p. 212] or lauryl pentachlorophenol (L.P.C.P.; trade name mystox, Catomance, Ltd.) overcomes the disadvantages of pentachlorophenol, i.e., leachability, volatility, and pungency, while retaining good mildew- and rotproofing properties. The Willesden or cuprammonium finish, [**30**, pp. 60, 530; **32**, p. 205], which has been in use since 1873, mainly for heavy cotton and flax canvas, is briefly described. The solution is padded on to the cloth

and then dried at a high temperature to remove the volatile ammonia and convert the Cu to a soluble oxide. The solution is a good solvent when the Cu content exceeds 10 g./l. The Cu content of the treated material should be not less than 1 or more than 1·5%. The green colour of the proofed fabric is apt to fade and pigments may be added to the final surface coating of wax (applied to soften the harsh 'handle' due to the treatment and prevent leaching) to ensure permanence.

The survey includes observations on other phenolic and Cu compounds, quaternary ammonium, Zn, and Hg compounds, chrome tinting, the mineral khaki process, and chemical modification of cellulose (of little commercial importance as yet), e.g. by partial acetylation, cyanoethylation, and thermo-setting resins, of which 1 prepared from bromophenol and formaldehyde has proved particularly effective.

Bomar (M.) & Lebedova (Mme A. H.). **Prorůstáni mikroorganismů papírem.** [Permeation of paper by micro-organisms.]—*Obaly*, **4**, 2, p. 61, 1958. [Russian, English, French, and German summaries in suppl.]

In tests at the Packaging Research Institute, Prague, Czechoslovakia, papers of low (109–250 g./sq. m.) and boards of high basis weight (375–500 g./sq. m.) were permeated within a few days at 20°–30° C. by bacteria and fungi, including *Mucor racemosus*, *Aspergillus niger*, and *Penicillium glaucum* [cf. **35**, p. 211; **37**, p. 426, *et passim*]. Hence full protection of foodstuffs against damage by such organisms cannot be ensured by the use of boxes made from a combination of brown outer and grey inner cardboard. In addition to suitable storage conditions the incorporation of [unspecified] microbicides into packaging materials is essential for the retention of 1st-class condition.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **6**, 12, pp. 190–192, 1958.

Details are given of the provisions of the Ministerial Decree of 30 Oct. 1957, published in *Gaz. Uff. Repub. Ital.* 12, 16 Jan. 1958, which amends and replaces Ministerial Decree of 1 July 1954 [**34**, p. 703] concerning the importation of plant material into Italy and its internal transit.

Linnemann (G.) & Meyer (H.). **Mycorrhiza und Phosphormangel.** [Mycorrhiza and phosphorus deficiency.]—*Forst. u. Holz*, **13**, 1, pp. 8–10, 1958.

The results of an examination at the Institut für Forstbotanik, Hann.-Münden, Germany, of unthrifty 2-yr.-old pines are discussed in the light of previous studies, especially those of Björkman [**22**, p. 266; **35**, p. 87]. Intense purple discoloration of the plants pointed to nutritional deficiency, particularly of P; the soil content in the north German afforestation area where they were growing was, in fact, only 1·8–3·6 mg./100 g. The affected plants, which had been obtained from a nursery, were almost devoid of mycorrhiza, in striking contrast to the abundant growth on the roots of home-grown material.

It has been shown that the nutrient uptake (especially P) of plants with good mycorrhiza far exceeds that of those without [cf. **17**, p. 126; **36**, p. 607]. In the present instance it is probable that the rich nursery soil impeded mycorrhizal formation and on transference to poorer soil growth came to a standstill.

Martin (J. T.), Batt (R. F.), & Roberts (Margaret F.). **Studies on the natural protective covering of plants : II. The wax and cutin of leaves and fruits.**—*Rep. agric. hort. Res. Sta. Bristol, 1957*, pp. 84–88, [1958].

The composition of the leaf cuticle of 7 different plants and stored apples [cf. **38**, p. 181] is given.

Treggi (G.). **Contributo allo studio delle esigenze auxologiche di alcuni funghi fitopatogeni.** [A contribution to the study of the auxological requirements

of some phytopathogenic fungi.]—*Ann. Sper. agr.*, N.S., **12**, 4, pp. 1305–1316, 2 graphs, 1958. [English summary. 37 ref.]

Tests in liquid culture at the University of Pisa of 7 spp. demonstrated that all were autotrophic for vitamins; only *Colletotrichum gloeosporioides* [*Glomerella cingulata*] and (to a slightly less extent) *Diplodia malorum* Earle were benefited by biotin and thiamin together. The growth of *Fusarium avenaceum* was markedly depressed by thiamin, even when other vitamins were added to the medium. *Thielaviopsis basicola* gave a strongly positive reaction to yeast extract. *Alternaria dianthi*, *Cercospora beticola*, and *Sphaeropsis necatrix* did not react appreciably to vitamins.

Gooding (G. V.) & Lucas (G. B.). **Factors affecting sporangial production in Phytophthora parasitica var. nicotianae.**—Abs. in *J. Elisha Mitchell sci. Soc.*, **74**, 2, p. 86, 1958.

Of 7 solutions tested, 1/100 M KNO_3 induced max. sporulation on potentially sporulating mycelium of *P. parasitica* var. *nicotianae* [**34**, p. 823] stripped from oatmeal agar plates, wetted, and incubated for 6 or more days at 24° C.; the min. was in double distilled water. Air appeared to be necessary but not light. The cardinal temps. for motility and germination of zoospores were 8, 20, and 32°. Zoospores remained motile longer and more germinated in 1% dextrose than in distilled water, tap water, or complete nutrient. More than 50% of the spores were motile after 4 hr. in a conc. of 1,000,000 spores/ml., but none were motile after 5 min. at 1,000/ml.

Purdy (L. H.). **Some factors affecting penetration and infection by Sclerotinia sclerotiorum.**—*Phytopathology*, **48**, 11, pp. 605–609, 2 fig., 1958.

Further studies at the University of California, Davis [cf. **36**, p. 128], showed that though ascospores of 3 isolates of *S. sclerotiorum* germinated in distilled water and in nutrient solutions lacking C, N, or an essential mineral element appressoria formed only in the presence of a C source and in contact with a cover slip. Spermodochia, on the other hand, formed in the absence of C, in all other solutions, and without mechanical stimulus. Except on Brussels sprout leaves inoculated at wounds, infection failed to occur on detached leaves of 7 different plants when ascospores were applied in distilled water, but it did so when the suspending solutions contained C. In a field of heavily infected Brussels sprouts, none of the infection appeared to have taken place through healthy intact tissue.

Ascospores freshly ejected from apothecia of isolates from ladino and red clover infected leaves of most plants of 8 hosts within 3–4 days (10–11 on tomato). Ascospores from lettuce [**38**, p. 114] and tomato isolates infected only bean [*Phaseolus vulgaris*] leaves, and these only if partially senescent. Mycelium from sclerotia proved infective only via non-living organic matter, attacking lettuces only if dead leaves were present [cf. **38**, p. 169].

Infection by ejected ascospores of clover isolates occurred in 36 hr. after formation of 1 appressorium at the tip of the germ tube. After 60 hr. mycelium appeared in the epidermal cells. Guard cell contents became disorganized when ascospores germinated 1–2 cells away from a stoma; there was no disorganization in epidermal cells beneath germinating spores before penetration.

Wilson (E. M.). **Aspartic and glutamic acid as self-inhibitors of uredospore germination.**—*Phytopathology*, **48**, 11, pp. 595–600, 1 fig., 3 graphs, 1958.

In studies at the University of California, Berkeley, 2 g. each of uredospores of *Cronartium ribicola*, *Puccinia graminis* f. sp. *tritici*, *P. helianthi*, *P. polygoni-amphibii* var. *persicariae*, *P. carthami*, and *Uromyces phaseoli* var. *typica* [*U. appendiculatus*] were suspended in 1 l. water dispensed in 6 open Petri dishes.

Pointed filter paper wicks suspended over the rims took up self-inhibitors [cf. **36**, p. 340] diffused from the spores; these were mostly concentrated at the pointed tips and were analysed chromatographically. For bioassay of inhibitors pieces of rust-infected tissue were placed on a thin film of 2% water agar and covered with a similar film into which the inhibitors diffused. After 3 hr. this was sparsely dusted with uredospores and inhibition zones observed under a dissecting microscope after 6 hr.

In the diffusates from *U. appendiculatus* spores were 8 substances which reacted chromatographically with ninhydrin; β-alanine, glutamic acid, and aspartic acid predominated, the last 2 being present in quantities sufficient to account for self-inhibition. Inhibitors were present in tissue surrounding rust pustules on bean [*Phaseolus vulgaris*] leaves [cf. **38**, p. 111], conc. being highest nearest the pustule.

Reduction of uredospore numbers of *U. appendiculatus* from $43{\cdot}5 \times 10^4$ to $6{\cdot}66 \times 10^4$/sq. cm. on water agar resulted in a 4-fold increase in their germination at 16–22° C. However, with spores developed under different conditions (*U. appendiculatus* at 18° and 60% R.H., and *Puccinia graminis* on wheat at 16° and 80–90%) inhibition with increase of spore numbers was not observed. Untreated spores of *U. appendiculatus* germinated best at 16° and inhibitor depleted at 20°.

At a spore conc. that almost inhibited germination some of the few germinated spores had unusually long germ tubes [cf. **36**, p. 159]; the relation between number of spores/unit of substratum and germ tube length was not explainable in terms of self-inhibitors, though glutamic acid and β-alanine at 10 (but not 1 or 100) p.p.m. caused a 4-fold increase in length.

Aqueous solutions of the self-inhibitors did not inhibit the growth of 7 spp. of bacteria or 3 spp. of fungi, nor the germination of seeds of oat, wheat, or pea at concs. sufficient to inhibit the germination of the rust spores investigated.

The protection against reinfection given by a previous infection of bean rust was decreased at lower temps. and was practically absent at 16°. When plants rusted to various degrees were held at 10–13°, 24–48°, or 30–35°, then inoculated and incubated at 16° and finally transferred to 27°, the number of reinfections in the medium and high sets was inversely proportional to the number of initial infections up to 8/sq. cm., but not after initial low temps. Reinfection was prevented when both incubation and development were at 26·5°, or incubation at 26·5° and development at 16·5°, but not the reverse. The low temp. effect apparently takes place during incubation, but whether it is due to a lessening in activity of the self-inhibitors or their decreased conc. in the presence of more free water was not determined.

Germination of bean rust uredospores and reinfections of rusted bean leaf tissue were increased by spraying the leaves with 50–100 p.p.m. coumarin or 9·2 p.p.m. 2,4-dinitrophenol [cf. **34**, p. 712]. Self inhibitors were found in uredospores of all the other rust spp. studied with the exception of *C. ribicola*. The germination of inhibitor-depleted bean rust uredospores was 50% greater in darkness than in daylight (which inhibited germination), that of untreated spores 70%; self-inhibition appears to be independent of photo-inhibition. When stored at relatively high temps. (in the range −17° to +31°) inhibitor-depleted uredospores maintained viability longer than undepleted. Uredospores presumed killed by propylene oxide vapour still gave a true bioassay for inhibitors.

Trunov (G. A.) & Maksyutin (G. V.). Сверхнизкие температуры и головня Пшеницы и Лука. [Extreme low temperatures and smut of Wheat and Onion.]—*J. Kharkov agric. Inst.*, **13**, 50, pp. 117–121, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 18, p. 207, 1958.]

In tests in 1954–5 wheat grain infected by smut [*Ustilago nuda*: **37**, p. 331] was exposed to −196° [C.] for 4 hr. and some control was obtained. After 48 hr. at

—5° and then 50 hr. in liquid N (—192°) no dwarf bunt [*Tilletia contraversa*: **37**, p. 765] developed. This treatment had no effect on germination. When spores of onion smut (*Urocystis cepulae*), however, were exposed to —196° for 50 hr. their viability was unimpaired.

Gorlenko (M. V.), Chinnov (E. A.), & Levkina (Mme L. M.). Биохимический метод определения паразитизма у грибов из родов **Alternaria** и **Cladosporium.** [Biochemical method for the determination of the parasitism of fungi of the genera *Alternaria* and *Cladosporium*.]—*C. R. Acad. Sci. U.S.S.R.*, **116**, 3, pp. 514–516, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 18, p. 204, 1958.]

In experiments at the Moscow University to determine the relationship between accumulated amino N and parasitic activity in *Alternaria* and *Cladosporium* spp. (already demonstrated for *Fusarium* spp.), the fungi were grown for 15 days in liquid culture containing 1% peptone, 0·1% KH_2PO_4, 0·1% $MgSO_4$, and 2% glucose. The mycelium was then washed and dried and the amino N content determined. Parasitic *Alternaria* spp. accumulated 6 mg. amino N/g. dry matter, the facultative parasites up to 15 mg., and the saprophytes up to 25 mg. Similar results were obtained with *Cladosporium* spp.

Van Assche (C.). **Antibiotica en plantenziekten.** [Antibiotics and plant diseases.] —*Agricultura, Louvain*, Sér. 2, **6**, 4, pp. 633–643, 1958. [French and English summaries.]

Some of this information from the Laboratorium voor Plantenziekten, University of Louvain, Belgium, has been noticed [**37**, p. 759]. The possible use of antibiotics for the elimination of *Ustilago tritici* [*U. nuda*] from wheat seed was the principal reason for examining the properties of humulon, lupulon, mycostatin, actinomycin, iturin (from *Bacillus subtilis* var. *ituriensis*), patulin, and agrimycin. The best results were obtained with mycostatin (500 p.p.m.), dissolved in cellulose acetate in acetone water, and patulin (500 or 1,000 p.p.m.) in pure water. Hydroxides and ultra-violet rays were applied to the seed for examination and chlordioxide-acetic acid to the leaf tissue.

Agrimycin (1/1,000 dust) was effective against a cyclamen bulb rot (*Pseudomonas* sp.) [cf. **36**, p. 808 *et passim*].

The incidence of *Erysiphe graminis* on barley was reduced by 75% by spraying young plants with agrimycin, iturin, or mycostatin (1/1,000) the day before inoculation.

Arnold (C. G.). **Antibiotische Stoffe aus Pflanzen-Samen.** [Antibiotic substances from plant seeds.]—*Z. Bot.*, **46**, 5–6, pp. 516–549, 4 fig., 1958. [83 ref.]

At the Botanische Institut, University of Erlangen, Germany, a fungistatic substance active against *Rhizopus nigricans* [*R. stolonifer*] was isolated from seeds of *Oenothera argentinea* and *O. odorata* [cf. **37**, p. 764]. Seed extracts retained their activity for at least 40 days but were inactivated by heating to 60° C.

Extracts of young seedlings just freed from the testa were inhibitory, suggesting that the antibiotic is localised in the embryo rather than in the testa. Extracts from fully grown plants were not fungistatic.

The inhibitor was not present in mature ovules, but appeared when the seeds ripened. Filtrates from *O. argentinea* seeds inhibited the growth of *Aspergillus niger* and *Absidia glauca*, that of *Penicillium glaucum* to a lesser extent, and that of *Trichoderma viride* only slightly.

Seed-bed observations of 16 plant spp. coupled with tests of seed extracts against *R. stolonifer* indicated that, in general, inhibition of mould development during germination resulted primarily from fungistatic substances in the seeds.

Darpoux (H.), Halmos (E.), & Leblanc (R.). **Étude de l'action systémique de diverses substances, la plupart antibiotiques.** [A study of the systemic action of various substances, mostly antibiotics.]—*Ann. Épiphyt.*, **9**, 3, pp. 387–414, 8 fig., 1958. [33 ref.]

A large number of antibiotic and synthetic organic materials were tested at the Station Centrale de Pathologie Végétale, Versailles, for systemic or endotherapeutic action. It was established from bioassays of sap or fragments of tissue that many are absorbed by the roots and might exert fungicidal or bactericidal activity in the aerial organs of the host. Systemic action would depend on the substance itself, its concentration, the test plant, and the prevailing temp. and humidity. Many materials, notably actidione and trichothecin, were very phytotoxic. Certain organo-mercurials are also absorbed by plants. Quinoline derivatives have a slight systemic action. Thiram, sodium dimethyldithiocarbamate, and sulphamerazine also appear able to act internally after root absorption. The test organisms were 3 bacteria, 1 actinomycete, 1 yeast, and 2 plant pathogenic fungi.

Voronkevich (I. V.), Afanas'eva (Mme Z. P.), Butsevich (L. A.), & Lipilina (Mme N. I.). Влияние удобрений на содержание в почве актиномицетов-антагонистов к фитопатогенным бактериям. [The effect of fertilizers on the soil content of actinomycetes antagonistic to phytopathogenic bacteria.]—*Microbiology, Moscow*, **27**, 6, pp. 720–723, 1958. [English summary.]

At the Experiment Station, Ermolino, Dimitrovski district, U.S.S.R., the application to podsol (pH 5·4) of mineral and organic fertilizers and lime resulted in a 5–26% increase in actinomycetes antagonistic to soft-rot bacteria such as *Bacterium carotovorum* [*Erwinia carotovora*] and *B.* [*E.*] *aroideae*. About half the antagonists were strains of *A.* [*Streptomyces*] *globisporus* [cf. **38**, p. 186] and about $\frac{1}{5}$ *A.* [*S.*] *griseus*.

Rayss (Tscharna) & Borut (S.). **Contribution to the knowledge of soil fungi in Israel.**—*Mycopathologia*, **10**, 2, pp. 142–174, 10 fig., 1958. [40 ref.]

This paper, the 1st publication on soil fungi of Israel, lists (with descriptive notes) 107 spp. (21 Mucorales, 49 Ascomycetes, and 37 Fungi Imperfecti) isolated from arid soils of the Judaean Desert and the Northern Negev. Cultivated fields, gardens, the sea shore, and river banks were also investigated to some extent; 11 of the fungi appear to be new to soils; 3 new forms are described; 23 spp. are common to Israel and Egypt.

Kononova (Mme M. M.). (Editor.) Микрофлора почв Европейской части СССР. [Soil microflora of the European U.S.S.R.]—258 pp., 2 col. pl., 48 fig., 4 diag., 12 graphs, U.S.S.R., Academy of Sciences, Moscow, 1957. Roubles 19.60. [343 ref.]

In the 1st part (pp. 5–173) Mme A. V. Rŷbalkina describes in detail the work done in 10 yr. on the microflora of the tundra, podzolic, and black (chernozem) soils with a chapter on Actinomycetes (pp. 78–103). The 2nd part by the same author and E. V. Kononenko (pp. 174–247) deals, *inter alia*, with pathogenic and beneficial fungi and yeast and yeast-like organisms.

Macura (J.) & Málek (I.). **Continuous-flow method for the study of microbiological processes in soil samples.**—*Nature, Lond.*, **182**, 4652, pp. 1796–1797, 1 fig., 1958.

A description from the Biological Institute, Czechoslovak Academy of Sciences, Prague, of a method which makes possible the introduction into the soil continuously of any desired amount of substrate, the transformation of which is studied. This is basically an application of the continuous-flow method of culture of

micro-organisms [cf. **32**, p. 547; **35**, p. 475] to the study of microbiological processes in the soil.

THORNTON (R. H.). **A soil fungus trap.**—*Nature, Lond.*, **182**, 4650, p. 1690, 1958.

This trap, designed at the Soil Bureau, Wellington, New Zealand, is better than the screened immersion-plate method [**36**, p. 125] which is less simple to make, cannot be used on stony ground, and upsets soil gas and moisture relations when inserted. A stainless steel rod fits closely into a stainless tube, twice its length, with a sharp cutting edge; 3 holes, $\frac{3}{32}$ in. diam., cut in the rod, opposite corresponding ones in the tube when the 2 are aligned, are filled with cool, sterile water agar by means of a syringe. When pushed into the soil the unoccupied half of the tube cuts a core of soil which is then compressed by the rod when the trap is pushed further; but the soil outside the tube, which eventually comes into contact with the agar, is undisturbed. After sterilization by dry heat (160° C. for 1 hr.) and filling, the holes in the rod are turned away from the apertures in the tube. When inserted horizontally at the required depth in the soil profile, the rod is turned so that the holes are opposite the apertures in the tube; before removal the rod is turned again. The agar plugs are punched out on to a nutrient medium.

THORNTON (R. H.). **Biological studies of some tussock-grassland soils. I. Introduction, soils and vegetation. II. Fungi.**—*N.Z.J. agric. Res.*, **1**, 6, pp. 913–921, 3 fig., pp. 922–938, 1958.

The fungi occurring in 3 soils under low-tussock (*Festuca-Poa*) grassland were examined at various seasons, employing previously used techniques [cf. **35**, p. 395 and above]. Approximately 100 spp. were isolated. The 3 soils are of similar mycelial status, that max. growth was obtained in summer, that non-sporing fungi, including *Rhizoctonia* sp. and *Papulaspora* sp., accounted for approximately 60% of all isolations, and that *Rhizoctonia* sp. was dominant in all 3 soils; in each area the list of spp. is very small. Soil plate isolations differed from screened plate, particularly in the absence of *Rhizoctonia* sp. [cf. **36**, p. 125]. Rhizosphere platings from tussock plants gave similar results to soil plates, and were dominated by *Trichoderma viride* and Mucorales. It is suggested that the soil fungal populations are greatly influenced by the roots of higher plants and their decay.

DI MENNA (M. E.). **Biological studies of some tussock-grassland soils. III. Yeasts.**—*N.Z.J. agric. Res.*, **1**, 6, pp. 939–942, 1958.

From areas of uncultivated tussock grassland [see above] samples of the same 3 soil types were examined and 13 yeast spp. isolated [cf. **38**, p. 66], of which only 5, *Cryptococcus albidus*, *C. diffluens*, *C. terreus*, *Candida humicola*, and *C. curvata*, occurred in important numbers.

[Other related papers in this series are IV. Bacteria. J. D. Stout, pp. 943–957; and VIII. Streptomycetes. T. R. Vernon, pp. 985–990.]

SWART (H. J.). **An investigation of the mycoflora in the soil of some Mangrove swamps.**—*Acta bot. neerl.*, **7**, 5, pp. 741–768, 2 fig., 2 maps, 1958.

The horizontal distribution of fungi in soil samples from 2 mangrove swamps on the island of Inhaca, Portuguese East Africa, was studied at the Dept of Botany, University of the Witwatersrand, Johannesburg, using Czapek and tomato decoction agar media. There was a positive correlation between the soil C (and probably also N) level and the variety of fungi. Phycomycetes appeared almost absent, though abundant in 1 sample taken further inland. Ascomycetes were rarely detected except for *Aspergillus* and *Penicillium*, of which many spp. were found in the swamps but relatively few in the sandy soils. No basidiomycetes were collected. *Fusarium* was common, particularly in the poorer soils. *Pestalotia* was

abundant in 1 of the swamps. Few hyaline but many dark Moniliales were encountered in most areas investigated. The surface vegetation varied as much as the mycoflora, there being indications that both are influenced more or less independently by soil conditions.

Lochhead (A. G.). **The soil microflora, the plant, and the root pathogen.**—*Trans. roy. Soc. Can.*, Ser. 3, **52**, Sect. 5, pp. 17–24, 1958.

In this address the author discusses the interrelationships between plant roots and the soil microflora in the light of the physiological activity of the micro-organisms at or near the root surface. The evidence accumulated indicates that the rhizosphere harbours a bacterial flora more active than that of the surrounding soil. A method was devised for classifying bacteria according to their nutritional requirements. It is considered reasonable to believe that the quantitative and qualitative changes undergone by the soil microflora in the root region are to be ascribed to changes in the available food supply. Growth factors should be taken into account in any attempt to throw light on mutual interactions between micro-organisms in soil. In conclusion, the suggestion is made that our fund of basic knowledge should include a better understanding of the general nutritional and growth factor requirements of the rhizosphere micro-organisms and of root-invading fungi.

Upitis (V. V.). Значение почвенных сапрофитных грибов в борьбе с возбудителями болезней сельскохозяйственных растении. [The importance of soil saprophytic fungi for the control of pathogens of agricultural plants.]—Сб. тр. защита раст. Рига АН Латв. ССР [*Sborn. Trud. Zashch. Rast., Riga*], *1956*, pp. 181–190, 1956. [Abs. in *Referat. Zh. Biol., 1958*, 16, p. 207, 1958.]

This is a detailed study of the fungal composition of the soils in Latvia S.S.R. A large number of saprophytes antagonistic to plant pathogenic fungi were isolated from humus soils. The most important observation was the inhibitory effect of *Trichoderma lignorum* [*T. viride*] on cabbage canker [*Phoma lingam*: **37**, p. 612: map 73]. When cabbage seed was treated with *T. viride*, the incidence of canker decreased 2–3 times.

Griffin (D. M.). **Influence of pH on the incidence of damping-off.**—*Trans. Brit. mycol. Soc.*, **41**, 4, pp. 483–490, 1 graph, 1958.

In experiments at the Botany School, University of Cambridge, using a wide range of soil reactions (pH 4–8), beet, *Brassica campestris*, *Picea sitchensis*, and *Pinus contorta* seedlings, and *Pythium ultimum* as a parasite, the incidence of damping-off in relation to soil pH was strongly negatively correlated with the growth rate of the host. Except for *Pinus contorta*, the pathogen/host growth rate ratio was not positively correlated with soil pH, the growth rate of the host, or that of the parasite.

Pandalai (K. M.), Sankarasubramoney (H.), & Menon (K. P. V.). **On the use of Sunnhemp (Crotalaria juncea) as an indicator plant for potassium and calcium deficiency in Coconut soils.**—*India Cocon. J.*, **10**, 1, pp. 17–27, 1 pl., 1956. [Received 1959.]

Comparative chemical analyses of samples of sunn hemp plants collected from areas producing normal healthy plants and also where growth was stunted, carried out at the Central Coconut Research Station, Kayangulam, Travancore, revealed deficiencies of K and Ca; the N/K ratio was higher in retarded than in normal plants. This was confirmed by sand culture experiments and field trials.

K deficiency produced severe yellowing of all except the innermost leaves, accompanied by withering of leaf tips and flaccidity of the leaves. Older leaves tended to be shed rapidly and maturity was retarded. Ca deficiency resulted in stunting and light yellow leaves. Plants deficient in both elements usually attained

a height of only 13 to 15·5 cm., compared with over 200 cm. for healthy. Since this crop responds readily to these elements, it is recommended as an indicator of K and Ca deficiency in the nutrition of the coconut palm, particularly in coastal sandy loam areas.

Zeĭnalova (Mme V. M.). Ржавчинные грибы на зерновых, кормовых и дикорастущих злаках Азербайджана. [Rust fungi on cereals, fodders, and wild grasses in Azerbaijan.]—Изв. Акад. Наук Азерб. ССР [*Bull. Acad. Sci., Azerb. S.S.R.*], *1957*, 11, pp. 103–112, 1957. [Russian summary. Abs. in *Referat. Zh. Biol., 1958*, 15, p. 211, 1958.]

A review is given of the ecological and climatic effects on the development of rusts in Azerbaijan. So far 52 spp. have been identified, 46 of which are in *Puccinia* and 6 in *Uromyces* [cf. **37**, p. 295].

Person (C.). **Development of concepts in rust genetics.**—*Proc. genet. Soc. Can.*, **3**, 1, pp. 25–29, 1958.

A brief review of the subject, noting important findings which have contributed to present day knowledge, and outlining problems which still remain to be solved.

Hino (I.). **Parasitic fungi on Bamboos in Japan. General remarks.**—*Bull. Fac. Agric. Yamaguti Univ.* 9, pp. 849–876, 1958. [82 ref.]

All the genera of parasitic fungi recorded on bamboos and the spp. recorded in Japan are listed. The host-pathogen relationships are discussed. The annual losses from disease are heavy.

Van den Ende (G.). **Untersuchungen über den Pflanzenparasiten Verticillium albo-atrum Reinke et Berth.** [Investigations of the plant parasite *V. albo-atrum*.]—*Acta bot. neerl.*, **7**, 5, pp. 665–740, 4 pl., 5 fig., 1 diag., 2 graphs, 1958. [English summary.]

In this detailed study at the Phytopathologisches Laboratorium 'Willie Commelin Scholten', Baarn, the Netherlands, 70 *V.* strains from different hosts in many localities were examined to determine whether the distinction between *V. albo-atrum* and *V. dahliae* is valid. Only 2 of the strains exhibited the bundled dark hyphae described by Reinke & Berthold (1879) for *V. albo-atrum*: these fell to pieces after some time, and budding of the individual cells led to the formation of structures indistinguishable from microsclerotia. Dark-hyphal strains could not be distinguished from microsclerotial strains by differences in spore measurements [cf. **21**, p. 203]. It is concluded that on morphological grounds the 2 spp. cannot stand [cf. **29**, p. 333], and that all the strains examined should be referred to *V. albo-atrum*, this name having priority. *In vitro* at 35° C. and above the dark mycelial forms died sooner than the microsclerotial. All the strains formed toxins inducing wilt, curling of the leaf margins, and interveinal discoloration in tomato shoots. The degree of toxicity, as indicated by the severity and rapidity of appearance of these symptoms, varied with individual strains but was correlated neither with pathogenicity nor morphology.

The fungus enters the host through root hairs or directly through the root cortex [cf. **37**, p. 673]. The spread of the fungus in *Impatiens balsamina* and ash occurred both by mycelial growth in the vessels and by transport of spores in the transpiration stream.

Cross-inoculations with strains of different origin revealed differences in pathogenicity, but strains restricted to a narrow host range were not found. It was, however, noted that tomato strains produced more distinct symptoms and spread more freely through tomato than did strains from other plant spp. A strain isolated from antirrhinum became more pathogenic to tomato after 3 passages through that

host, but in antirrhinum it did not change; one from tomato, however, was not affected by passage through antirrhinum.

The fungus spreads in the soil by hyphal growth [cf. **33**, p. 545]. Only in organic remains is it able to withstand the competition of the soil microflora. Spread from the roots of inoculated antirrhinum plants to adjacent healthy plants occurred within one season [loc. cit.]. Attacks on antirrhinum plants grown in one plot for 4 yr. diminished successively, and the microsclerotial strains caused only slight infection and the dark mycelial none. It would appear that *V. albo-atrum* is a soil-invader rather than a soil-inhabitant [loc. cit.].

Colonies developing readily from microsclerotia on agar probably derive from attached hyphae or spores lying between the thick, dark-walled cells; when these are killed by disinfection no colonies developed. In no instance were the cells of the microsclerotia seen to germinate.

Remains of infected roots and stems should be destroyed. A good soil structure and a suitable crop rotation improves the health of the plants: in the year after an infection no susceptible crop should be grown. As some weeds, such as *Solanum nigrum* and *Chrysanthemum leucanthemum*, carry the fungus without symptoms, attention to weed control is of some importance.

Satō (K.) & Shōji (T. S.). **Pathogenicity of Rhizoctonia solani Kühn isolated from graminaceous weeds in forestry nurseries.**—*Bull. For. Exp. Sta. Meguro* 96, pp. 89–104, 4 pl., 2 graphs, 1957. [Japanese. Abs. from English summary.]

Isolates of *Rhizoctonia* [*Corticium*] *solani* from grasses, *Pinus densiflora*, and *Robinia pseudoacacia* caused severe damping-off of pine seedlings in inoculation experiments. The grass isolates were more virulent to *Amorpha fruticosa*, dent corn, and *Setaria lutescens* than to *P. densiflora*, while those from the pine were moderately virulent.

These results do not support the view that *C. solani* is more virulent in its original host than in other host species inoculated [cf. **34**, p. 691; **37**, p. 145].

All isolates tested were pathogenic to rice; *C. sasakii* from rice and isolates from *Setaria viridis* and *Herochloe odorata* caused sheath spot, though the symptoms produced by *C. sasakii* were the most marked. The grass isolates also differed from *C. sasakii* in being more virulent to pine.

Contrary to the views held by several Japanese plant pathologists as to the differences in parasitic behaviour between *C. sasakii* and *C. solani*, the results of the present inoculation experiments show that the various isolates of *C. solani* were severely pathogenic to Gramineae.

Hazra (A. K.), Bose (S. K.), & Guha (B. C.). **A rapid method of survey of cellulolytic power of fungi.**—*Sci. & Cult.*, **24**, 1, pp. 39–40, 2 fig., 1958.

At the University College of Technology, Calcutta, cellulose pulp [cf. **34**, p. 311] obtained from filter paper or absorbent cotton, disintegrated by soaking in conc. HCl, washed, and ground, was incorporated (0·25%) into a mineral agar medium, plus 0·05 g. yeast extract. Single colony cultures of various filamentous fungi were made at different points on the medium and incubated for 48 hr. at room temp. (29–33° C.). The plates were then flooded with chloro-iodide of Zn to map out the zone of lysis. The diam. of the uncoloured zone gives a measure of the cellulolytic power of the fungi. This method compares fairly well with other known methods of assay. A few hundred strains can be compared in 2 days.

Krieg (A.). **Virusforschung — Ergebnisse, und Probleme.** [Virus research—results and problems.]—*Ber. naturw. Ver. Darmstadt, 1956–7*, pp. 13–27, 4 fig., 1957. [19 ref.]

An appraisal of the present status of virus research, covering *inter alia* multiplication, the pathogenesis and pathology of virus infections, transmission, control, latent infection and tolerance, 'integrated' viruses, and the origin of viruses.

Heinze (K.). **Das pflanzliche Virus im Überträger und seine Einbringung in die Pflanze.** [The plant virus in the vector and its transmission to the plant.]—*Z. angew. Zool.*, **44**, 2, pp. 187–227, 1957. [English summary. 267 ref.]

A detailed review of present knowledge, with mention of over 400 vectors [cf. **36**, p. 750; **37**, p. 219].

White (N. H.). **The relationships of plants to viruses.**—*J. Aust. Inst. agric. Sci.*, **24**, 4, pp. 319–323, 1958. [13 ref.]

After a brief introduction dealing with the misuse of terms in respect of the pathogen-host relationship, the author discusses the subject under the main headings of plants resistant to infection, resistant to systemic infection, and susceptible to systemic infection. In the broadest terms, resistance to virus infection is the general rule among plants, and susceptibility the exception.

Hitchborn (J. H.). **The distribution of viruses in leaves and their inactivation by ultra-violet irradiation.**—*Ann. appl. Biol.*, **46**, 4, pp. 563–570, 1958. [11 ref.]

In experiments at the Agricultural Research Council Virus Research Unit, Cambridge, the conc. of virus in expressed sap from the lower epidermis stripped from leaves of White Burley tobacco plants systemically infected by *Myzus persicae* with potato virus Y and from Kawala tobacco plants with henbane mosaic virus or tobacco mosaic virus was about the same as that in the underlying mesophyll. Ultra-violet irradiation of tobacco leaves infected with potato virus Y or henbane mosaic virus greatly reduced the infectivity of sap expressed from subepidermal tissues [cf. **35**, p. 579]. The evidence obtained did not support the suggestion of Bawden *et al* [cf. **34**, p. 207] that non-persistent, aphid-transmitted viruses are located mainly in the leaf epidermis.

Bergmann (L.). **Über den Einfluß von Thiouracil und Cytovirin auf das Wachstum und die Virusproduktion isolierter Tomatenwurzeln.** [On the influence of thiouracil and cytovirin on the growth and the virus production of isolated Tomato roots.]—*Phytopath. Z.*, **34**, 2, pp. 209–220, 3 graphs, 1958. [English summary.]

At the Max–Planck Institut für Biologie, Tübingen, Germany, tomato roots all derived from the same clone were grown in nutrient solution and part inoculated with tobacco mosaic virus by abrading them in a virus containing solution with quartz dust. The roots were then transferred to a sterile nutrient solution and when lateral roots had developed some were tested for virus content on *Nicotiana glutinosa*. Others were used for sub-cultures in fresh nutrient solution. Approx. half were found to contain virus, producing in one test 200–300 necroses/leaf, but in another only 10–30. Multiplication was continued from roots with high virus content. New roots from these usually lost virus in the course of a few passages. The virus-infected roots contained 20–24 mg. virus/g. dry weight, roughly equivalent to 2%, but there was no difference in growth between infected and non-infected roots. Cytovirin [**37**, p. 28] and thiouracil [**37**, p. 461] reduced both growth and virus production, growth more so than the latter. There was no reduction of virus infectivity by cytovirin as has been described for thiouracil [loc. cit.].

Marxer (A.), Giobbio (V.), Magri (S.), Mondino (A.), Olivetti (S.), & Segre (G.). **Immunisation contre la maladie de Newcastle (animal-virus) avec le virus du mosaic du tabac (plant virus).** [Immunization against Newcastle disease (animal virus) with Tobacco mosaic virus (plant virus).]—*Naturwissenschaften*, **45**, 1, pp. 15–16, 1958.

At the Laboratoires de Recherches de la Soc. Argent. Productos Marxer, Monte Grande, Buenos Aires, 15-day chicks inoculated intranasally with tobacco mosaic virus on 3 successive days showed no resistance to Newcastle disease [cf. **37**, p. 218]

when placed in contact with an experimentally infected bird 1 month later, but they were immunized against the disease by inoculation of tobacco mosaic virus into the pectoral muscle 14 days before exposure.

Götte (W.). **Chenopodium quinoa als Testpflanze für das Rübenmosaikvirus und andere Viren.** [*C. quinoa* as a test plant for Beet mosaic virus and other viruses.] —*Z. PflKrankh.*, **65**, 1, pp. 18–20, 3 fig., 1958.

At the Institut für Gemüsebau und Unkrautforschung, Neuss-Lauvenburg, Germany, beet mosaic virus, inoculated by sap abrasion into *C. quinoa* [cf. **37**, p. 754], gave rise to greyish-green, local lesions and early desiccation of the inoculated leaves, which remained attached. Brownish, later sunken, streaks appeared on the stem immediately above and below the affected leaves, and the axillary shoots became deformed and dried. Leaves and side shoots dependent on the same vascular bundles as the inoculated leaves also became distorted and died early, and the top of the plant drooped shortly after the wilting of the inoculated leaves. The youngest leaves exhibited vein-clearing, and those formed after inoculation were bent, pale yellow, and small. The plant died early.

Inoculated with beet yellows virus by *Myzus persicae*, the plants developed systemic infection: leaves formed after infection showed vein-clearing and were smaller and less markedly serrate than those of the controls.

Symptoms are also briefly described for two unidentified viruses isolated from strawberry.

Quarterly Progress Report West African Cocoa Research Institute, Ghana, 51. 24 pp., 1958. [Cyclostyled.]

At Koroboto, Nigeria, in an area under observation since Sept. 1953 where farms badly infected with cacao swollen shoot virus have been sprayed since Jan. 1956 with gamma-BHC to control capsids, trees have shown a striking recovery in general condition despite the fact that virus infection had increased from 24·4 to 63·7 in July 1958. The canopy has been largely restored, ground vegetation has almost disappeared, and crops have increased, though regional production in the rest of the area has fallen and adjacent unsprayed farms continue to deteriorate. It is apparent that when capsids are controlled the virus is not lethal, and its effects are comparable to those of varying environmental factors. Experiments are now planned to study the possible interaction between swollen shoot virus and *Calonectria rigidiuscula* [**36**, p. 10], as its effect may prove to be related to the conditions under which the cacao is growing. It is indicated that factors responsible for die-back may, in fact, play a greater part in the deterioration of cacao than virus attack [cf. **17**, p. 224].

Slykhuis (J. T.) & Watson (Marion A.). **Striate mosaic of cereals in Europe and its transmission by Delphacodes pellucida (Fab.).**—*Ann. appl. Biol.*, **46**, 4, pp. 542–553, 1 pl., 1958. [13 ref.]

In experiments at Rothamsted Experimental Station on wheat striate mosaic virus it was ascertained that while a few *D. pellucida* [**37**, p. 631] were already infective when caught in the field, the number was increased by feeding for 24 hr. or more on diseased plants; up to 56% of the insects became infective after feeding on such plants for 3 days. Non-infective insects were unable to transmit until 8–36 days after first feeding, but thereafter they frequently remained infective for the rest of their lives, i.e. up to 10 weeks. Infective insects seldom transmitted during test feeds of only 30 min. When fed for at least 1 day on each test plant some insects infected many plants in succession, others few even when allowed to feed for 7 days on each. The virus was transmitted through the eggs to up to 88% of the progeny; some of the progeny of a few females which had failed to infect wheat plants were infective. Possible reasons for this erratic transmission of the virus are discussed.

Haunold (E.). **Die Rostkrankheiten im Getreidebau.** [Rust diseases in cereal cultivation.]—*Pflanzenarzt*, **11**, 10, pp. 109–110, 1958.

A popular note listing the cereal rusts to be found in Austria, with descriptions of the life-cycles.

Keil (L. H.), Frohlich (H. P.), & Van Hook (J. O.). **Chemical control of cereal rusts. I. Protective and eradicative control of Rye leaf rust in the greenhouse with various chemical compounds.**

Peturson (B.), Forsyth (F. R.), & Lyon (C. B.). **II. Control of leaf rust of Wheat with experimental chemicals under field conditions.**

Keil (H. L.), Frohlich (H. P.), & Glassick (C. E.). **III. The influence of nickel compounds on Rye leaf rust in the greenhouse.**—*Phytopathology*, **48**, 12, pp. 652–655; pp. 655–657, 1 graph; pp. 690–695, 1 graph, 1958.

Results are presented of fungicide trials by Rohm & Haas Co. at Bristol, Pennsylvania, using as a test fungus *Puccinia rubigovera* [*P. triticina*] spray-inoculated on potted Balbo rye seedlings. Many of the 200 compounds tested had protective properties, and a few were eradicative when applied 5 days after inoculation, either reducing the number of erupting pustules or causing the developing uredosori to change from dark brown to light yellow and become non-infective. Nickel salt amine complexes, sprayed at $\frac{1}{2}$ or 1 lb./100 gal.+1:4,000 triton B-1956 were the most promising in suppressing development after infection, while causing little or no injury, the eradicative property apparently stemming from the Ni, and the protective from the amine as well. The dinitro-1-methylheptylphenol derivatives (including karathane), the dithiocarbamates and their derivatives, and organic sulphites tested also gave varying degrees of control, but some were unduly phytotoxic.

In paper III details are given of comparative trials with the Ni amine complexes and cheaper and more accessible Ni compounds, all + triton B-1956 or triton X-114 at 1:4,000. Simulated rainfall (2 in./20 min.) was provided after some of the treatments. Of 13 simple organic and inorganic Ni compounds (at 0·5 and 0·25 lb./100 gal.), only the fluoborate was phytotoxic; most conferred good protection but the effect was lost after 'rain'; all proved effective eradicants, even when 'rain' was applied 2 hr. after spraying. Bis [*N*-(2-hydroxyethyl)dodecylmethylbenzylamine]-nickel(II)chloride (RH-1) and *N*-(2 hydroxyethyl)dodecylmethylbenzylamine-(RH-8) were excellent protectants, with little loss of effectiveness in 'rain' tests, whereas the poorer control conferred by nickel chloride hexahydrate (RH-9) was lost almost completely. RH-1 and RH-9 were good eradicants even with 'rain', but RH-8 was ineffective. RH-9 at 0·5 lb./100 gal. applied 1, 5, and 60 min. before 'rain' at the fleck stage (25% sori about to rupture) reduced pustules from over 20/plant to 3–7, 1, and 0, respectively. As an eradicant RH-9 at 25–50 g. reduced infection to 10% of that in the untreated but 70–140 g. were needed for protection; it was not phytotoxic at these levels. The most effective time for eradication with Ni compounds is at the fleck stage, 5 days after inoculation in these tests. A mixture of RH-9 with dithane gave effective protection and eradication, depending on the amount of Ni, even with 'rain', the former being washed off, but not the latter.

In field trials (paper II) in 1956 by the Canada Dept Agric., Winnipeg, Manitoba, of 13 chemicals against *P. triticina* on Thatcher wheat [cf. **37**, pp. 529, 639], RH-1, RH-2 (bis [*N*-(2-hydroxyethyl)dodecylamine]nickel(II)chloride), RH-3 (bis [*N*, *N*-di(2-hydroxyethyl)dodecylamine]nickel(II)chloride), and RH-6 (bis[*N*-(2-hydroxyethyl)dodecylbenzylamine] nickel(II)chloride) gave the most promising results. The chemicals, at 2 or 4 lb./acre, were applied at the heading stage (7 Aug.), when the plants carried 3–5% infection on the lower leaves, and a fortnight later. RH-6 at 4 lb. reduced av. infection from 83·8 (untreated) to 5·5%.

Wilcoxson (R. D.). **A study of penetration by Puccinia graminis var. tritici.**—*Diss. Abstr.*, **18**, 4, pp. 1204–1205, 1958.

No correlation was noted at the University of Minnesota between the amount of infection by stem rust and the waxy bloom on wheat plant surfaces, stomatal behaviour [cf. **37**, p. 767], or the illumination applied to plants in dew chambers. Infection of seedlings of 3 vars. by race 15B was significantly reduced by the application of $HgCl_2$ after the plants had been removed from the dew chambers, indicating that penetration may take place when the plants are no longer in a saturated atmosphere [**38**, p. 137]. Usually penetrations started 8 hr. after the plants had been removed and continued for several days, but occasional substomatal vesicles developed in the dew chambers. Most hyphal penetrations occurred at 65° F. and 95% R.H. for 8 hr. and least at 75° and 50% [cf. **37**, p. 765].

Emge (R. G.). **The influence of light and temperature on the formation of infection-type structures of Puccinia graminis var. tritici on artificial substrates.**—*Phytopathology*, **48**, 12, pp. 649–652, 2 fig., 1958.

At Fort Detrick, Frederick, Maryland, uredospores were germinated on 3 types of cellulose membrane [**28**, p. 517] on 1% water agar and on the agar itself for 2 hr. in the dark at 70–75° F., then exposed in a saturated atmosphere for 6 hr. [cf. below] to various light and temp. conditions, and finally for 16–18 hr. to darkness and various temp. [cf. above]. In sunlight at 2,000–5,000 ft.-c. and 80–85°, 80% of the germinated spores formed appressoria-like structures in 2–3 hr.; after 5 hr. 60% of the appressoria had produced penetration pegs, and after 5–6 hr. 90% of these had formed vesicles. During the ensuing dark period at $85 \pm 2{\cdot}5°$ infection hyphae appeared. In sunlight at 75–80°, in darkness at 85°, or in fluorescent white light at 1,000 ft.-c. and 78–81°, similar structures developed, but in smaller numbers and at a slower rate. Sunlight over 9,000 ft.-c. or temps. of 88° or above were inhibitory. If any factor deviates sufficiently from the opt. for inducing the formation of infective structures development or differentiation stops and is not resumed on renewal of the opt. environment. The structures were formed on all the substrata.

Lange (C. T.), Kingsolver (C. H.), Mitchell (J. E.), & Cherry (E.). **Determination of the effects of different temperatures on uredial infection with Puccinia graminis var. tritici.**—*Phytopathology*, **48**, 12, pp. 658–660, 1 fig., 1 diag., 1 graph, 1958.

Variable-temperature dew chambers used at Fort Detrick, Frederick, Maryland, are described [cf. above]. By regulation of the temp. in the water tank at the base under the plant rack and in the cooling coils in the walls, the air temp. in the chambers could be controlled between 50 and 100° F. In these experiments potted Baart wheat seedlings were inoculated in the chamber with measured quantities of *P. graminis* spores ejected from gelatine capsules broken by a blast of compressed CO_2, the ensuing spore cloud giving a uniform deposit. The seedlings were exposed to dew for 20 hr. and then removed to a greenhouse at 75° for pustule counts 10–14 days later. An 8° differential between air and water-tank temp. gave the best dew deposition and infection. The opt. temp. for infection was 75°, the min. circa 60°, and the max. near 85°. Infection fell about 10% for each ° F. below opt., and slightly more rapidly above opt.

Wilcoxson (R. D.) & Paharia (K. D.). **A study of the progeny from the self-fertilization of race 111 of Puccinia graminis var. tritici.**—*Phytopathology*, **48**, 12, pp. 644–645, 1958.

At the University of Minnesota, St. Paul, race 111 was selfed on barberry [cf. **34**,

p. 142; **37**, p. 712]. Of 15 races differentiated among 23 isolates of the progeny, 8 appeared to be new [cf. **37**, p. 81], 4 differed somewhat from known races, 2 were practically identical with 187 and 54, and only 1 resembled, but was not identical with, the parent culture. Lee, Khapli, and Vernal were resistant to all the isolates and Little Club was susceptible; Marquis, Kota, and Reliance [**38**, p. 195] were susceptible to most, the durum wheats and Einkorn resistant.

Allan (R. E.). **Genetic analysis of ten sources for Hessian fly resistance, their interrelationships and association with leaf rust resistance.**—*Diss. Abstr.*, **18**, 4, pp. 1193–1194, 1958.

Studies at Kansas State College of 3 wheat crosses in the F_4 generation indicated that Pawnee possesses a partially dominant factor for resistance to leaf rust [*Puccinia triticina*] races 9 and 11; a partially dominant factor in Sel. 52400, derived from Hard Federation, for resistance to races 5, 9, and 15 [**37**, p. 81] was linked with the partially dominant factor for Hessian fly [*Mayetiola destructor*] resistance in the same selection. One factor from Pawnee and 2 from Sel. 52400 governed resistance to race 9, but one from the latter suppressed the Pawnee factor, while the other was partially dominant for resistance to leaf rust, and was located on chromosome XIV. A recessive factor governing resistance to race 15 possessed by Pawnee-PI 94587, CI 12855, was inherited independently of the Hessian fly (Hp_6) factor.

Pichler (F.). **Zur Frage der Flugbrandbekämpfung mittels Einquellung oder Benetzung des Saatgutes.** [On the question of loose smut control by soaking or wetting the seed.]—*Z. PflKrankh.*, **65**, 8, pp. 472–475, 1958. [English summary.]

Using Niemann's data on the control of *Ustilago tritici* [*U. nuda*] on wheat [**37**, p. 404] the author found that, both with cold water soaking and anaerobic wetting, the necessary duration of treatment for complete control (h) was dependent on temp. (t), according to the formula $t = \text{k. log } h+c$, the mean value of the constants being practically the same for the 2 processes ($k = 17{\cdot}6$ and $17{\cdot}9$, respectively; $c = 61{\cdot}9$, $62{\cdot}5$).

Popp (W.). **An improved method of detecting loose-smut mycelium in whole embryos of Wheat and Barley.**—*Phytopathology*, **48**, 12, pp. 641–643, 2 fig., 1958.

In this technique for observations on loose smut [*Ustilago nuda*: cf. **37**, p. 340] described from the Canada Dept Agric., Winnipeg, Manitoba, all heating is done in a pressure cooker at 5 lb. Barley is first dehulled in a modified Waring Blendor homogenizer. The embryos are separated by boiling the kernels (barley 30 min., wheat 1 hr.) in 3% NaOH+12% water glass and 0·04% detergent, then floated off in more water glass. To clear they are boiled for 45 min. in 12% ethanol+15% NaOH, washed, heated again for 1 min. in 3:1 ethanol:glacial acetic, and finally for 1 min. in 45% lactic acid [cf. **37**, p. 340]. They are then heated in 45% acetic acid containing 0·1% trypan blue, excess stain being removed by final heating and mounting in 45% lactic acid on grooved plastic (lucite) slides.

Urries (M. J.). **Razas fisiológicas de Tilletia foetida (Wallr.) Liro en España** [Physiological races of *T. foetida* in Spain.]—*An. Inst. bot. A. J. Cavanilles*, **16**, pp. 339–346, 1958.

At the Jardín Botánico, Madrid, in 1954–5, and at the Estación Experimental de Aula Dei, Zaragoza, in 1955–6, 4 and 11 collections, respectively, from 15 different localities in Spain were tested on 10 differential wheat vars. Race L3 of *T. foetida* occurred in 2 samples, L 10 in 3, while 5 hitherto unknown races, designated A–E,

occurred in 2, 3, 3, 1, and 1 samples, respectively; Ridit, Odessa, and Ulka were susceptible to all 5.

Gregory (P. H.) & Stedman (O. J.). **Spore dispersal in Ophiobolus graminis and other fungi of cereal foot rots.**—*Trans. Brit. mycol. Soc.*, **41**, 4, pp. 449–456, 3 graphs, 1958.

Records of air sampling [cf. **37**, p. 642] with a Hirst trap at Rothamsted, conducted during Oct. 1953, 0·5 m. above wheat stubble bearing fructifications of *O. graminis*, *Cercosporella herpotrichoides*, and *Fusarium culmorum* showed that ascospores of the 1st named [**35**, p. 586] were never caught on dry days or after less than 0·01 in. rainfall, while max. conc. (3,700/cu. m.) was attained within 2 hr. of 0·05 in. rainfall, peak rate of liberation occurring within 45 min. after wetting. All mature ascospores were discharged during 4 hr. of rain, but more matured after a few dry days. It is recalled that infection of wheat with ascospores of *O. graminis* has not been reported. A few conidia of *C. herpotrichoides* appeared after a trace of rain, and numbers remained constant through increasing rain and never exceeded $\frac{1}{10}$ of *O. graminis*. The conc. of coloured basidiospores [**37**, p. 642] remained constant irrespective of weather and time of day, while *Cladosporium* was more common by day than by night; no macroconidia of *F.* were detected.

Kirchner (H.-A.). **Ein Beitrag zur Frage der Phytotoxizität von quecksilberhaltigen Trockenbeizmitteln.** [A contribution to the question of the phytotoxicity of dry mercurial dressings.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F. **12**, 10, pp. 189–192, 8 graphs, 1958. [Russian and English summaries.]

At the Institut für Phytopathologie und Pflanzenschutz, University of Rostock, the dry seed dressings germisan and ceresan were only very slightly phytoxic to germinating Peco summer wheat and Derenburger Silber winter wheat, an overdose of 100% usually stimulating seedling growth [cf. **37**, p. 654].

Eliseeva (Mme V. M.). К вопросу о причинах 'болезни обработки' Пшеницы на торфяной почве. [On the question of 'reclamation disease' in Wheat in peat soil.]—*Bull. Tomsk Univ.* 141, pp. 111–120, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 18, p. 207, 1958.]

Investigations at Serov marsh, Tomsk region, U.S.S.R., on this physiological disorder of wheat [cf. **15**, p. 792] and other cereals [unspecified], characterized by whitening and withering of the leaf tips and arrested growth and development of secondary roots, showed it to be caused by disturbance of the metabolism, particularly in relation to Fe. When Cu is deficient in the soil, Fe precipitates on the surface of the root tissues, which causes death. When $CuSO_4$ at 1–100 kg./ha. was applied incidence decreased markedly and yield increased.

Moseman (J. G.) & Starling (T. M.). **Genetics of resistance of the Barley varieties Ricardo and Modia to several cultures of Erysiphe graminis f. sp. hordei.**—*Phytopathology*, **48**, 11, pp. 601–604, 1958.

At Beltsville, Maryland, and Virginia Agricultural Experiment Station, Blacksburg, the progeny of crosses between the barley vars. Kentucky 1 and Smooth Awn 86, susceptible to most strains of *E. graminis* [**36**, p. 18; **37**, p. 158], and Modia and Ricardo resistant, were inoculated with 6 strains of the pathogen. Ricardo was found to contain 1 dominant gene conditioning resistance to strain cultures nos. BC 3, T 4, NC 9, and VA 11; Modia has 1 such gene for BC 3, CR 3, T 4, NC 9, VA 11, and CAN 12 and an additional dominant gene for resistance to BC 3, CR 3, and T 4. The reaction of 145 F_3 lines of Modia × Kentucky 1 showed that resistance to both CR 3 and CAN 12 was conditioned by the same dominant gene and that the 2nd such gene endowing resistance to CR 3 was inherited independently.

GRAFIUS (J. E.) & KIESLING (R. L.). **Vector representation of biologic fields of force.**—*Agron. J.*, **50**, 12, pp. 757–760, 1 graph, 4 diag., 1958.

At Michigan State University Agricultural Experiment Station, East Lansing, a vector method (vector = a set of genotypes acting on the environment) was developed to assess the effect of *Erysiphe graminis* in relation to night temp. on the yield of barley, described in terms of an angle θ from a given axis representing the severity of the epiphytotic, and in terms of the degree of determination by the forces in the 'mildew plane' (depending on prevalence). The authors give a formula and method of working, using relative percentage values for the character to be measured.

MCCLEAN (A. P. D.), MARLOTH (R. H.), & ENGELBRECHT (A. H. P.). **Exocortis in South African Citrus trees.**—*S. Afr. J. agric. Sci.*, **1**, 3, pp. 293–297, 1 pl., 1958. [Afrikaans and French summaries.]

The occurrence of exocortis virus [cf. **38**, p. 3; map 291] in the parent trees of some citrus vars. at the Citrus and Subtropical Horticultural Research Station, Nelspruit, is shown by the behaviour of daughter trees on trifoliate orange (*Poncirus trifoliata*) stocks. Scaling of the bark of dwarfed Washington navel orange and grapefruit on such roots [**30**, p. 268] had been previously noted. Sweet oranges which showed this reaction include Washington Tomango, Mediterranean Sweet, Hamlin, and Shamouti, and the grapefruits Marsh, Triumph, and Ellen. The occurrence of the virus in private orchards is not yet known. Other vars., including Valencia, Pretoria navel, Du Roi, and De Wildt have grown normally on trifoliate stock and are considered virus-free. No exocortis developed in Washington or Marsh from seedlings on trifoliate stocks, and as the parent trees were infected this confirms the observation made elsewhere that the virus is not seedborne.

BITANCOURT (A. A.). **As manchas da fôlha do Cafeeiro.** [The leaf spots of Coffee.] —*Biológico*, **24**, 10, pp. 191–201, 2 col. pl., 1958.

Essential information is presented on the following, among other pathogens and physiological disorders of importance in São Paulo, Brazil: *Pseudomonas garcae* [**37**, p. 42], *Cercospora coffeae*, distinguishable from *C. coffeicola* (not yet found in the State) by its nearly 3 times larger conidiophores and conidia, *Septoria berkeleyi*, *Colletotrichum coffeanum* (*C. gloeosporioides* var.) [*Glomerella cingulata*], oil spot, ring spot virus, *Mycena citricolor*, and various forms of chlorosis.

Oil spot, 1st observed in 1938, is characterized by numerous, sometimes coalescent, infiltrated, pale green areas, < 2–3 mm. diam., occasionally with a brown spot in the centre. The berries may also be involved. The same condition was recently observed by Wellman in Costa Rica, where it is very severe and is attributed to a virus on the basis of grafting experiments. Transmission tests in São Paulo, however, have been unsuccessful and the progress of the disease is very slow.

Ring spot virus [**20**, p. 402], observed for the 1st time in the Parahyba Valley in 1937, also moves very slowly, infection apparently spreading directly from tree to tree.

HOLLIS (J. P.). **Relations between root knot and Fusarium vascular discoloration in Cotton varieties.**—*Phytopathology*, **48**, 12, pp. 661–665, 1958.

Studies by the Louisiana Agricultural Experiment Sta., Baton Rouge, of 4 cotton vars. in 7 naturally infested fields showed a correlation between root knot caused by *Meloidogyne incognita* and vascular discoloration due to *F. oxysporum* f. *vasinfectum* [cf. **34**, p. 453], each rating individually thus: var. DPL 15 > Coker 100 Wilt > Plains = Auburn 56. Rated for vascular discoloration/unit root knot, the order was DPL 15 > Plains = Auburn 56 > Coker 100 Wilt.

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